OS-299 (11-13)

pennsylvania
DEPARTMENT OF TRANSPORTATION
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TRANSMITTAL LETTER

PUBLICATION: 113

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SUBJECT: Highway Foreman Manual

INFORMATION AND SPECIAL INSTRUCTIONS:

Chapter 3 - Special Coding-Payroll
Coding Charts
Removed the Production Contents from pages 3-10 through 3-30 (Reference from MORIS)

Chapter 5 – Definitions
Important Notes:
Added Environmental and Training statements

Performance Standards for Programs 711-714: (Assembly Updates/Changes)
Assembly 711-7121-01 - Verbiage Change
Assembly 711-7121-02 - Verbiage Change
Assembly 711-7121-03 - Deleted and Added 711-7324-05
Assembly 711-7121-04 - Verbiage Change
Assembly 711-7121-05 - New Assembly (Mechanized Cutting)
Assembly 711-7124-01 - Verbiage Change
Assembly 711-7124-02 - Verbiage Change
Assembly 711-7124-03 - New Assembly (Old 711-7134-01)
Assembly 711-7124-04 - New Assembly (Surface Treatment - Double Seal)
Assembly 711-7124-09 - Verbiage Change
Assembly 711-7126-04 - Verbiage Change
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Assembly 711-7225-01 - Verbiage Change
Assembly 711-7224-09 - Verbiage Change
Assembly 711-7226-01 - Verbiage Change
Assembly 711-7226-02 - Verbiage Change
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INFORMATION AND SPECIAL INSTRUCTIONS CON'T:

Assembly 711-7312-01 - Verbiage Change
Assembly 711-7312-02 - Verbiage Change
Assembly 711-7312-03 - Verbiage Change
Assembly 711-7314-01 - Verbiage Change
Assembly 711-7315-01 - Verbiage Change
Assembly 711-7321-01 - Verbiage Change
Assembly 711-7321-02 - Verbiage Change
Assembly 711-7324-01 - Verbiage Change
Assembly 711-7324-02 - Verbiage Change
Assembly 711-7324-03 - Verbiage Change
Assembly 711-7324-04 - Verbiage Change
Assembly 711-7324-05 - New Assembly (Old 711-7121-03)
Assembly 711-7324-09 - Verbiage Change
Assembly 711-7325-01 - Verbiage Change
Assembly 711-7326-01 - Verbiage Change
Assembly 711-7328-01 - Verbiage Change

CANCEL AND DESTROY THE FOLLOWING:

All previsouly issued Foreman's Manuals
(Pub 113)

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APPROVED FOR ISSUANCE BY:

Richard N. Roman

Richard N. Roman, P.E., Director
Bureau of Maintenance and Operations

Bureau of Maintenance and Operations

Highway Foreman Manual

July 2017

pennsylvania
DEPARTMENT OF TRANSPORTATION

PUB 113 (7-17)

HIGHWAY FOREMAN MANUAL
Publication 113
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CHAPTER 1 - INTRODUCTION

INTRODUCTION

Each Maintenance Manager from the Assistant District Engineer-Maintenance to the Highway Foreman is expected to provide quality maintenance and economic utilization of men, equipment and materials.

This Foreman Manual describes those parts of the system involving work reporting, activity method and procedures, and work productivity.

WORK REPORTING

The foreman reports work completed by his crew on his daily payroll. Production, material usage, and payroll data will be recorded on the preprinted payroll.

The Work Reporting Section of this manual includes several procedures that should be thoroughly understood by every foreman.

1. Work activities are grouped into major programs which include similar maintenance operations or functions. Examples of work programs are roads, shoulders, snow and ice control, etc.

2. It is important that the work your crew performs be charged to the correct work program (Program/Assembly/Method).

3. The majority of maintenance work assemblies can be planned and can be reasonably measured. When you perform these work assemblies you are to report the number of units completed.

4. The Payroll form is used for both payroll and production reporting purposes. It must be completed daily.

PLANNING AND SCHEDULING

There are limits to the number of men and pieces of equipment available to each maintenance organization. One of the keys to improving utilization of men and equipment is by planning and scheduling. This involves thinking about work in advance. Specifically, planning and scheduling:

- Decide what needs to be done
- Decide what it will take in terms of men, equipment and materials
- Decide when it is to be accomplished.

It is generally recognized that a large portion of highway maintenance work can be anticipated, planned and scheduled.

PLANNING	—	LONG TERM PLANNING (LTP)
SPECIFIC NEEDS IDENTIFIED	—	NOTIFICATIONS
SCHEDULING	—	WORK ORDERS AND CAPACITY LEVELING
WORK REPORTING	—	DAILY PAYROLL (ZIPY)
REVIEW	—	PERFORMANCE EVALUATION

PERFORMANCE STANDARDS

You do only what needs to be done and you do it the most efficient way possible. Performance Standards are designed to help you do this by answering the following questions:

1. What is an adequate job of maintenance?

2. Under normal circumstances, what size crew can best handle the job?

3. What is usually the most efficient method for performing each job?

4. Under normal circumstances, how much work should be accomplished using the standard method and crew size?

Performance Standards have been developed for the majority of work activities, which you will be performing. A complete set of these standards has been included in this manual (See Chapter 5). You should carefully review the standards for your assigned work so you fully understand what is expected from you and your crew.

Deviation from a Performance Standard is expected when situations such as the following exist:

1. Emergency conditions requiring immediate attention exist and men are not available to work in accordance with the Performance Standards.

2. You have been asked to try a new method and procedure.

3. Conditions surrounding the job are not typical and require a special approach.

However, keep in mind that to deviate from an established Performance Standard without good reason usually results in:

- Excessive levels of service or

- Sub-standard levels of service or

- Excessive cost due to overstaffing or

- Excessive cost due to understaffing

When any one of these conditions occur, it indicates that someone is not doing his job satisfactorily. Make sure you do your part by using the Performance Standards that have been developed. Ask for help from your Assistant Maintenance Manager if you don't understand a particular standard.

We want to improve maintenance operations through the development of new methods and procedures. We expect that many of the new ideas will come from you. As you discover a better way to do things, let your supervisor know so it can be evaluated and considered for statewide application.

CHAPTER 2 – PAYROLL

PAYROLL OVERVIEW

The Payroll Entry Function furnishes information describing the daily performance of a work crew. It identifies:

- The projects being performed
- The composition of the crew
- The hours worked and the leave taken
- The work accomplished
- Equipment (Department) usage
- Material usage (Rental Equipment Included)

The data captured provides the daily information needed to generate paychecks, establishes a base of data for costing procedures, management analysis, material and equipment usage, and serves as the foreman's diary.

The Payroll function is comprised of two components: The Payroll Form and the Payroll Entry screens. The Payroll Form is preprinted by the computer and contains details of the assemblies selected from the 6146 and the crew, equipment and material used to accomplish those activities.

The foreman reviews this form periodically throughout the day, entering weather and break information. At the end of each day he enters the hours worked and checks how closely the day's work agrees with the generated data. If there are any adjustments, the foreman makes them directly on the form and initials all changes. After the completed forms are signed they are input into the SAP system using the ZIPY Payroll Entry transaction.

The materials section of the Payroll Form and Screen can also be preprinted by the system. If this section is preprinted then the foreman only needs to make adjustments. If the material section is not preprinted then it is completed by the foreman to reflect any materials obtained on a daily basis from a stockpile or a vendor on line or overnight. When the payroll is entered the data recorded by the foreman will adjust materials inventory.

All foremen receive preprinted payroll forms to record their daily work activities and the hours worked by their crews. All data that has to be manually entered must be in BLACK INK. The foreman enters:

- Regular hours, break and lunch times, depart and return times
- Weather conditions
- Assembly area location
- Production accomplished
- Hours worked
- Materials used
- Pertinent remarks (See pg. 2-41 for details)
- Signs the payroll

If the remaining data on the form agrees with the work performed, no modifications are necessary. If there are changes, the foreman makes them directly on the form by crossing out any incorrect information, writing in the correct data and initialing the change. It is essential that these changes be neat, legible and in black ink. Refer to the **"PAYROLL COMPLETENESS & QUALITY SECTION"** on page 41 for further details on completing a payroll.

To satisfy legal requirements, a preprinted Payroll form is generated for each day of the week, including weekends. The form generated for Saturday and Sunday may contain data only on the ID line (DAY, PLANT, DATE & FOREMAN). If work is performed on a weekend day, the foreman will fill out this preprinted form with all necessary information. If the form is used it then serves as an input document. Whether the form is used or not it will be filed and placed on microfiche with all other payroll documents.

Should a "DUPLICATE' pre-printed payroll be used (the word "DUPLICATE" will appear in the upper right hand corner of the payroll) the original payroll must be attached or a reason written in the payroll remarks section as to what happened to the original – example: printer jammed while printing original payrolls.

Payroll forms are returned to the county offices for review and input. All changes made to the payroll must be initialed. Payrolls should be input daily and as a general rule should be input no more than two working days from the actual payroll date. Foreman must return all materials delivery tickets to the office as soon as possible.

When the person entering the payroll accesses the screen all of the preprinted data is displayed on the screen. The only input necessary is production data and modifications made by the foreman or reviewer.

PAYROLL FORM - (System Created)

CREW DAILY PROJECT TIME RECORD & DIARY *(ZIPY Highway Payroll)*

pennsylvania DEPARTMENT OF TRANSPORTATION

C-65C (11-09)

Day	Plant	Month/Day/Year	Foreman	Page Of Pages
Monday	78XX	3/26/2012	20	1 of 1

	Start	End
Break 1		
Break 2		
Meal		
Weather		
Reg Hours		
Assembly Area Loc		
Safety		
Depart		
Return		

WR	Work Order	Oper	Notification	Assembly	Actual PU's	Units	Prod Hrs	SR	From Seg	From Off	To Seg	To Off

Changed

From Seg	From Off	To Seg	To Off

Alternate Activities

Personnel Number	Employee Name	Start/End Time	Attd Type	Prem Code	Position	Code	Hrs WO 1	OT	Hrs WO 2	OT	Hrs WO 3	OT	Hrs WO 4	OT	Hrs WO 5	OT	Leave Code 1	Leave Hours 1	Leave Code 2	Leave Hours 2	Refusal Code	Refusal Hours	Offered By

Equipment Number	Plant	Operator	Hrs WO 1	Hrs WO 2	Hrs WO 3	Hrs WO 4	Hrs WO 5	W R	Item Cat	Material	Description	Reservation	Line Item	PO#	Line Item	Qty	UoM	Plant	Sloc	Mix %
P																				
P																				
P																				
P																				
P																				
P																				
P																				
P																				
P																				
P																				

WO Ref				

Foreman's Signature:	*Date:*
Employee's Signature:	*Date:*
Rented Equip. Operator:	*Date:*
Inspected By:	*Date:*
Assistant or Maint. Mgr:	*Date:*

PAYROLL FORM (COMMERCIAL PRINTED)

CREW DAILY PROJECT TIME RECORD & DIARY

pennsylvania DEPARTMENT OF TRANSPORTATION

C-65C (9-13)

Changed

Day	Plant	Month/Day/Year	Foreman	Page	of Pages	Txn

	Start	End
Break 1		
Break 2		
Meal		
Weather		
Reg Hours		
Assembly Area Loc		
Safety		
Depart		
Return		

WR	Work Order	Oper	Assembly	Actual PU's	Units	Prod Hrs	SR	From Seg	From Off	To Seg	To Off	FC	From Seg	From Off	To Seg	To Off

Clarify Above Activities

Personnel Number	Employee Name	Start/End Time	Attd Type	Prem Code	Position	Just Code	Hrs WO 1	OT	MA	Hrs WO 2	OT	MA	Hrs WO 3	OT	MA	Hrs WO 4	OT	MA	Hrs WO 5	OT	MA	Leave Code 1	Leave Hours 1	Leave Code 2	Leave Hours 2	Refusal Code	Refusal Hours	Offered By

Equipment Number	Plant	Operator	Hrs WO 1	Hrs WO 2	Hrs WO 3	Hrs WO 4	Hrs WO 5	WR	Item Cat	Material	Description	Reservation	Line Item	PO#	Line Item	Qty	UoM	Plant	Sloc	Mix %

WO Ref	WZTC	Remarks

Foreman's Signature:	*Date:*
Employee's Signature:	*Date:*
Rented Equip. Operator:	*Date:*
Inspected By:	*Date:*
Assistant or Maint. Mgr:	*Date:*

E&S ☐

The payroll form reflects the information scheduled on the Weekly Plan (6146) for a specified day of the week. In the Weekly Plan shown below, assembly 711 - 7121 – 01 scheduled for the week beginning July 7, 2007 in Lackawanna County (0420). The work is to be done by Foreman Yontas (#41). The foreman as well as the rest of the crew are listed in the lower half of the Weekly Plan, also included here are the crew's employee numbers, their scheduled days to work, the equipment assigned to the crew, the days the equipment will be available, the quantity and types of material to be used, remarks and alternate activity schedules.

6146 HIGHWAY WEEKLY PLAN 41

WEEK OF: 07/07/07 PLANT . 7835 ASSISTANT: FOREMAN: GEORGE YONTAS

DAY	STATE ROUTE	FROM SEG	FROM OFF	TO SEG	TO OFF	WORK ORDER	DESCRIPTION	PLANT	ASSEMBLY	ASSEMBLY DESCRIPTION	UM	TOTAL PLANNED	COMPLETED TO DATE	REMAINING
MON	0632	0170	0000	0180	0000	50111682	Patching	7835	711712101	Roads-Paved Patch-Manual	TON	16.0	0.0	16.0
TUE	0632	0170	0000	0180	0000	50111682	Patching	7835	711712101	Roads-Paved Patch-Manual	TON	16.0	0.0	16.0
WED	1013	0060	0000	0100	0000	50111683	Patching	7835	711712101	Roads-Paved Patch-Manual	TON	24.0	0.0	24.0
THU	1013	0060	0000	0100	0000	50111683	Patching	7835	711712101	Roads-Paved Patch-Manual	TON	24.0	0.0	24.0
FRI	1013	0060	0000	0100	0000	50111683	Patching	7835	711712101	Roads-Paved Patch-Manual	TON	24.0	0.0	24.0
ALT		0000		0000		50107331	SWO - Pub Ser-Litter/ Debris-Pickup	7863	714773501	Pub Ser-Litter/ Debris-Pickup	H	0.0	0.0	0.0
ALT		0000		0000		50107331	SWO - Pub Ser-Litter/ Debris-Pickup	7863	714773501	Pub Ser-Litter/ Debris-Pickup	H	0.0	0.0	0.0
ALT		0000		0000		50107331	SWO - Pub Ser-Litter/ Debris-Pickup	7863	714773501	Pub Ser-Litter/ Debris-Pickup	H	0.0	0.0	0.0
ALT		0000		0000		50107331	SWO - Pub Ser-Litter/ Debris-Pickup	7863	714773501	Pub Ser-Litter/ Debris-Pickup	H	0.0	0.0	0.0
ALT		0000		0000		50107331	SWO - Pub Ser-Litter/ Debris-Pickup	7863	714773501	Pub Ser-Litter/ Debris-Pickup	H	0.0	0.0	0.0

EMPLOYEE NAME	EMPLOYEE NUMBER	DAYS S S M T W T F	EQUIPMENT NUMBER	DAYS S S M T W T F	MATERIAL NUMBER	MATERIAL DESCRIPTION	RESERVATION NUMBER	LINE ITEM	PURCHASE ORDER	LINE ITEM	QUANTITY	UM	PLANT	SLOC	DAY
Foley,Kara	00531287		P0374437				0000000000	0000		00000	0.000				
Gillott,John	00074951		P2382073				0000000000	0000		00000	0.000				
Havenstrite,Charles	00566461		P4401858				0000000000	0000		00000	0.000				
Hoffman,Walter	00040332		P4435056				0000000000	0000		00000	0.000				
Jones,Delbert	00069616		P4628076				0000000000	0000		00000	0.000				
Jones,Kevin	00544148		P6333034				0000000000	0000		00000	0.000				
Klesryk,Michael	00011886		P7758071				0000000000	0000		00000	0.000				
Mcgregor,Robert	00503498		P8011868				0000000000	0000		00000	0.000				
Merrill,Kyle	00544160						0000000000	0000		00000	0.000				
Phillips,William	00422207						0000000000	0000		00000	0.000				
Yontas,George	00512276						0000000000	0000		00000	0.000				

REMARKS :

NO REMARKS TO DISPLAY

Completion of a Payroll

The following pages contain examples of how to complete a payroll. The payrolls have been system generated from the Weekly Schedule described on the previous page.

During the day the foreman writes the following information on the form:

- Safety Talk
- Weather conditions
- Meal and break times
- Assembly area
- Departure time
- Return Time

At the end of the day the foreman writes the information needed to complete the payroll form.

In this example, normal conditions occur:

- crew has worked on a single project
- has worked a normal 7.5 hour shift
- normal weather conditions
- no location change

The foreman only needs to enter the hours worked by his crew (30 hrs.), the actual production accomplished (4 tons) and a description of the work performed in the remarks section, and sign the payroll

Planned Activity Completed with no change.

CREW DAILY PROJECT TIME RECORD & DIARY *(ZIPY Highway Payroll)*

pennsylvania DEPARTMENT OF TRANSPORTATION

C-65C (11-09)

Day	Plant	Month/Day/Year	Foreman	Page Of Pages
Monday	78XX	3/26/2012	20	1 of 1

	Start	End
Break 1	10:00	10:15
Break 2	14:00	14:15
Meal	12:00	12:30
Weather		
Reg Hours	0700-1500	
Assembly Area Loc	Main	
Safety	Hat & Vest	
Depart	7:15	
Return	14:45	

WR	Work Order	Oper	Notification	Assembly	Actual PU's	Units	Prod Hrs	SR	From Seg	From Off	To Seg	To Off
1	5000137	10	1500000310	711712103		Ton		1004	0010	0000	0050	2890

Changed

From Seg	From Off	To Seg	To Off

Alternate Activities

Personnel Number	Employee Name	Start/End Time	Attd Type	Prem Code	Hrs WO 1	Hrs WO 2	Hrs WO 3	Hrs WO 4	Hrs WO 5	Leave Code 1	Leave Hours 1	Leave Code 2	Leave Hours 2	Refusal Code	Refusal Hours	Offered By
120012	Johnson, S		RT													
423579	Baker, A		RT													
444222	Jones, C		RT													
321456	Long, M		RT													

Equipment Number	Plant	Operator	Hrs WO 1	Hrs WO 2	Hrs WO 3	Hrs WO 4	Hrs WO 5	OT	Item Cat	Material	Description	Reservation	Line Item	PO#	Qty	UoM	Plant	Sloc	Mix %
P 5801111	78XX	120012																	
P 3278944	78XX	423579																	
P 1280771	78XX	444222																	
P 1142073	78XX	321456																	
P																			
P																			
P																			
P																			
P																			

WO Ref

Foreman's Signature: *Date:*

Employee's Signature: *Date:*

Rented Equip. Operator: *Date:*

Inspected By: *Date:*

Assistant or Maint. Mgr. *Date:*

Planned Activity Completed – Segments and Offsets Changed

CREW DAILY PROJECT TIME RECORD & DIARY *(ZIPY Highway Payroll)*

pennsylvania DEPARTMENT OF TRANSPORTATION

C-65C (11-09)

Day	Plant	Month/Day/Year	Foreman	Page Of Pages
Monday	78XX	3/26/2012	20	1 of 1

	Start	End
Break 1	10:00	10:15
Break 2	14:00	14:15
Meal	12:00	12:30
Weather	Sunny	
Reg Hours	0700-1500	
Assembly Area Loc	Main	
Safety	Hat & Vest	
Depart	7:15	
Return	14:45	

WR	Work Order	Oper	Notification	Assembly	Actual PU's	Units	Prod Hrs	SR	From Seg	From Off	To Seg	To Off	Refusal Code	Refusal Hours
1	50000137	10	1500000310	711712103	4.0	Ton	30.0	1004	~~0010~~	~~0000~~	~~0010~~	~~2000~~		0020

Alternate Activities

Personnel Number	Employee Name	Start/End Time	Attd Type	Prem Code	Hrs WO 1	Hrs WO 2	Hrs WO 3	Just Code	Hrs WO 1 OT	Hrs WO 4	Hrs WO 5	Leave Code 1	Leave Hours 1	Leave Code 2	Leave Hours 2	Offered By
120012	Johnson, S		RT		7.5											
423579	Baker, A		RT		7.5											
444222	Jones, C		RT		7.5											
321456	Long, M		RT		7.5											

Equipment Number	Plant	Operator	Hrs WO 1	Hrs WO 2	Hrs WO 3	Hrs WO 4	Hrs WO 5	W R	Item Cat	Material	Description	Reservation	Line Item	PO#	Line Item	Qty	UoM	Plant	Sloc	Mix %
P 5801111	78XX	120012	7.5					1	C	320550			1	4600422	1	40		78XX		
P 3278944	78XX	423579	7.5																	
P 1280771	78XX	444222	7.5																	
P 1142073	78XX	321456	7.5																	
P																				
P																				
P																				
P																				
P																				

WO Ref

Patched 10 pipe trenches
Road scheduled for overlay

Foreman's Signature: [signature] Date: 3/26/12

Employee's Signature: Date:

Rented Equip. Operator: Date:

Inspected By: Date:

Assistant or Maint. Mgr: Date:

Planned Activity Changed and Unplanned Activity Accomplished

CREW DAILY PROJECT TIME RECORD & DIARY *(ZIPY Highway Payroll)*

pennsylvania DEPARTMENT OF TRANSPORTATION

C-65C (11-09)

Day	Plant	Month/Day/Year	Foreman	Page Of Pages
Monday	78XX	3/26/2012	20	1 of 1

	Start	End
Break 1	10:00	10:15
Break 2	14:00	14:15
Meal	12:00	12:30
Weather	Sunny	
Reg Hours	0700-1500	
Assembly Area Loc	Main	
Safety	Hat & Vest	
Depart	7:15	
Return	14:45	

Changed

WR	Work Order	Oper	Notification	Assembly	Actual PU's	Units	Prod Hrs	SR	From Seg	From Off	To Seg	To Off
~~4~~	~~60000137~~	~~10~~	~~150000010~~	~~74174103~~		~~Ton~~		~~1004~~	~~0010~~	~~0000~~	~~0050~~	~~2000~~
/			711731202	1200		Feet	30.0	2001	0030	0000	0050	1200

From Seg	From Off	To Seg	To Off

Alternate Activities

Personnel Number	Employee Name	Start/End Time	Attd Type	Prem Code	Hrs WO 1	Just Code	Hrs WO 3	Hrs WO 4	Hrs WO 5	W R	Item Cat	Material	Description	Leave Code 1	Leave Hours 1	Leave Code 2	Leave Hours 2	Refusal Code	Refusal Hours	Offered By
120012	Johnson, S		RT		7.5															
423579	Baker, A		RT		7.5															
444222	Jones, C		RT		7.5															
321456	Long, M		RT		7.5															

Equipment Number	Plant	Operator	Hrs WO 1	Hrs WO 2	Hrs WO 3	Hrs WO 4	Hrs WO 5	W R	Item Cat	Material	Description	Reservation	Line Item	PO#	Refusal Code	Refusal Hours	Offered By	Qty	UoM	Plant	Sloc	Mix %
P 5801111	78XX	120012	7.5																			
P 3278944	78XX	423579	7.5																			
P 1280771	78XX	444222	7.5																			
P 1142073	78XX	321456	7.5																			
P																						
P																						
P																						
P																						

WO Ref	
	Assembly changed due to severe
	storms last night requiring emergency
	ditch cleaning

Foreman's Signature: Date: 3/26/12

Employee's Signature: Date:

Rented Equip. Operator: Date:

Inspected By: Date:

Assistant or Maint. Mgr: Date:

Assembly work order and notification will be entered by the Assistant Manager or Coordinator.

DUPLICATE PAYROLL

When a second Payroll is printed from a weekly plan the word 'Duplicate' is printed in the upper right hand corner of the payroll (next to the payroll header).

If the assistant manager or designated individual has not already written the reason for the 'Duplicate' payroll, the foreman should bring it to their attention. The reason for the duplicate is to be written in the remarks section.

PAYROLL RETENTION

The original hard copy payroll document is to be held in the county office for 13 months. At the end of that time the documents for the pay periods included in that 13th month will be forwarded to the Micrographics Outsourcing Section to be scanned into an electronic file format for local archive retention. All payrolls submitted to the Micrographics Outsourcing Section are to be bundled by pay periods – with an appropriately completed OS-880 coversheet (see following figure) as the first page of each pay period bundle. All paper clips and staples must be removed prior to sending a payroll bundle to the Micrographics Outsourcing Section; otherwise, only the first page (coversheet) will be scanned. Any data written on the back of a payroll will NOT be scanned. If additional information is required a blank page referencing the original Payroll ID Line should be used. The address for the Micrographics Outsourcing Section is: PA Department of Revenue; Bureau of Administrative Services; Micrographics Outsourcing Section; 12th Floor Strawberry Square; Harrisburg, PA 17128.

The Micrographics Outsourcing Section will forward a CD of scanned pay period files to the Bureau of Maintenance and Operations (BOMO) whenever they have received enough payroll batches from the counties to fill a disc. The paper payroll document will be destroyed after it has been converted to an electronic file format. BOMO will create a set of discs for each District as soon as it receives all of the payroll files for all of the Counties for a subject District in a given calendar year. The set of discs (produced by BOMO) will consist of one District DVD (that contains all of the payroll files for all of their Counties for a given year) and one CD for each County (that contains all of the payroll files for that County for the given year). BOMO will forward the set of discs to the appropriate District Plant Maintenance (PM) Coordinator. The District PM Coordinator will then forward the District DVD to the District Records Coordinator, and the County CDs are forwarded to the appropriate County Records Liaison.

The payroll records are to be kept for seven (7) years. The (previously used) microfiche payroll records should be maintained for seven (7) years after the pay period ending date listed on a subject microfiche sheet and then destroyed after that time has passed. The electronic payroll records (contained on the DVDs and CDs) should be maintained for seven (7) years after the most recent (last) pay period ending date file contained on the disc and then destroyed after that time has passed.

OS-880 (11-10)

pennsylvania
DEPARTMENT OF TRANSPORTATION
www.dot.state.pa.us

INSTRUCTIONS: *Documents must be BATCHED according to Pay Period Ending Date. All paper clips and staples must be removed.*

TO: PA DEPARTMENT OF REVENUE
BUREAU OF ADMINISTRATIVE SERVICES
MICROGRAPHICS OUTSOURCING SECTION
12TH FLOOR STRAWBERRY SQUARE
HARRISBURG, PA 17128

FROM: COUNTY

SAP FUNDS CENTER:

CONTACT NAME:

TELEPHONE #:

E-MAIL ADDRESS:

PAY PERIOD ENDING DATE: (mm/dd/yy)

AFTER PROCESSING, MICROGRAPHICS WILL SEND ONE CD TO BUREAU OF MAINTENANCE AND OPERATIONS (BOMO).

PA DEPARTMENT OF TRANSPORTATION
BUREAU OF MAINTENANCE AND OPERATIONS
MAINTENANCE SYSTEMS AND REPORTING
6TH FLOOR KEYSTONE BUILDING
400 NORTH STREET
HARRISBURG, PA 17120

BOMO WILL ANNUALLY CREATE A DVD FOR THE DISTRICT THAT CONTAINS ALL OF THE PAYROLL FILES FOR ALL OF THEIR COUNTIES IN A SUBJECT CALENDAR YEAR AND A CD FOR EACH OF THEIR COUNTIES THAT CONTAINS ALL OF THE PAYROLL FILES FOR THAT COUNTY IN A SUBJECT CALENDAR YEAR. THE DVDS AND CDS WILL BE CREATED FOR A DISTRICT AS SOON AS BOMO RECEIVES ALL OF THE PAYROLL FILES FOR ALL OF THE COUNTIES IN A DISTRICT FOR A GIVEN CALENDAR YEAR. THIS SHOULD NORMALLY OCCUR IN APPROXIMATELY FEBRUARY OF EACH YEAR FOR THE CALENDAR YEAR THAT ENDED 13 MONTHS EARLIER. BOMO WILL THEN FORWARD THE DISTRICT DVD AND THE CORRESPONDING COUNTY CDS TO THE APPROPRIATE DISTRICT PLANT MAINTENANCE COORDINATOR, WHO THEN FORWARDS THE DISTRICT DVD TO THE DISTRICT RECORDS LIAISON AND THE COUNTY CDS TO THE COUNTY RECORDS LIAISON FOR RETENTION.

PAYROLL COMPLETENESS AND QUALITY

Since the payroll is now the accepted legal document for maintenance operations and will be microfiche all areas of the form must be carefully addressed.

All data entered manually must be in black ink and any changes made to pre-printed or manually entered data must be in black ink and initialed by the person making the change.

The payroll must be totally completed. Please ensure all information required in the upper left hand corner is completed. Close attention should also be paid to the remarks section of the payroll. As a minimum the remarks section of a payroll shall contain a written description of the activities performed in the top half of the payroll. This is especially important when "Other" activities are performed since such a variety of functions can be reported under the "Other" activity codes.

When the pre-printed planned activity is changed a reason for the change will be given in the remarks section. When personnel are removed from the payroll whom they are reassigned to shall be noted in the remarks section or noted in personnel column on left. If a 'DUPLICATE PAYROLL' is used the reason it was needed will be written in the remarks section (printer jammed etc.). Attaching the original payroll to the duplicate is also acceptable.

Faxed copies of the payroll can be used as an original payroll. They should be stamped “original”. (Original signatures required)

As a result of tort cases the Department's legal staff has requested that special attention be paid to detailing the location of work for certain activities not requiring an SR, segments and/or offsets. These activities include reimbursable guide rail work (Program 612), and emergency sign work (paying special attention to regulatory signs such as stop, yield, one way, do not enter, etc.) This historical information is captured and are retained within the notification.

The payroll must be completed legibly and neatly. A strong emphasis should be placed in this area, printing should be strongly encouraged. The importance of a payrolls completeness and legibility cannot be overemphasized.

FOREMAN’S DIARY (unchanged except for adding title, but moved from PAYROLL RETENTION section)

PennDOT will no longer provide an official "Foreman's Diary." If the foreman wishes to maintain a bound book of information he feels should be maintained, he may do so. This version may contain confidential information not legally required, but which should be documented.

WEEKLY PLAN - COMPLAINT CREWS

For those counties using complaint crews it is permissible to print payrolls without a planned activity since these crews respond to daily problems/emergencies. Unplanned complaint crews are limited to one per assistant manager, and must be described as a complaint crew in the remarks section of the payroll.

NOTIFICATION SCREEN

When an assistant manager and/or foreman finds no deficiencies on a section of highway he is to record that section on the notification using any activity (Recommend using 719-9829), and in the remarks section of the notification "no deficiencies found" must be noted. The date section, as to when-the survey was conducted, must also be completed.

CHAPTER 3: SPECIAL CODING

PAY CODE AND ATTENDANCE TYPES

Pay codes and attendance types are used to record special situations such as shift differential, hours worked on a holiday, etc. The codes/types identified below shall be used to report time worked.

Attendance Types	
RT	All Time Including Overtime
RTC	Comp Leave Earned in lieu of OT PAY
CT	Call Time (contract required 3 hr min. pay)
CTC	Call Time (Contract required 3 hr min. pay) w/Comp Leave Earned in lieu of OT Pay
STY	Standby Time
STYC	Standby Time w/Comp Leave Earned in lieu of OT Pay
ART	Time worked on Floating AWS day off (specialized crews)
ARTC	Time worked on Floating AWS day off (specialized crews) w/Comp Leave Earned in lieu of OT Pay
ST1	Supplemental Straight Time (do not use wo direction from Timekeeper)

Premium Codes	
10	Higher Class
11	Higher Class / Shift Differential
12	Higher Class / Maintenance & Trades Double Time
13	Higher Class / Maintenance & Trades Double Time / Shift Differential
20	Maintenance & Trades Double Time
30	Shift Differential
31	Shift Differential / Maintenance & Trades Double Time

NOTE: Both wage and permanent employee's times are reported through the SAP System.

PARTIAL HOUR REPORTING

The following partial hours are the only figures that will be accepted by SAP:

- 1/4 HOUR = .25 (Normal Break), 1/2 HOUR = .5, 3/4 HOUR = .75

EXAMPLE 1

CODE **TO IDENTIFY**

30 Hours worked at straight and overtime rates plus shift differential.

An employee worked 7.5 hours during his regular shift from 4:00 a.m. to 12:00 noon.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT	30			7.5					

EXAMPLE 2a

CODE	TO IDENTIFY
20	Hours worked on a winter holiday - not on Standby.

An employee worked 12.0 hours - 3.0 hours inside shift.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT	20			12.0				H	4.5

EXAMPLE 2b

CODE	TO IDENTIFY
20 Con't	Hours worked on a winter holiday - not on standby

An employee worked 7.5 hours - none inside shift.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT	20			7.5				H	7.5

EXAMPLE 2c

CODE	TO IDENTIFY
20 Con't	Hours worked on a winter holiday- not on standby

An employee worked 7.5 hours - all inside shift.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT	20			7.5					

EXAMPLE 3

CODE	TO IDENTIFY
N/A	Hours worked on a non-winter holiday or a winter holiday where employee was placed on stand-by. Record the number of hours worked under the appropriate project to complete a 7.5 hour day. Also record the starting and stopping times in the remarks section of the time record.

An employee worked 4.0 hours on a holiday, all of which was during his regular shift, time should be recorded as:

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT				4.0				H	3.5

EXAMPLE 4

CODE	TO IDENTIFY
30	Hours worked on a holiday at holiday pay plus shift differential rates.

An employee worked 7.5 hours on a holiday on the 12 noon to 8:00 p.m. shift. His regularly scheduled work shift is 4:00 a.m. to 12 noon.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT	30			7.5				H	7.5

Note: An employee is NOT entitled to shift differential on a holiday when he works less than a full shift (seven and one-half hours). This also applies when he works his scheduled days off. A full shift is a must in order for an employe to be entitled to shift differential rates.

COMPENSATORY TIME EARNED

SAP has the capability to report and track compensatory time earned. The example below demonstrates the coding of compensatory time (RTC).

When the employee has (with management's approval) elected to take comp time the comp time will apply to all straight overtime and premium overtime for that day.

EXAMPLE 1

An employee works 10.0 hours on a regularly scheduled work day and wants comp time instead of overtime pay.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT C				10.0					

Comp time for the first half hour over 7.5 will be calculated at straight time and the 2 hours after that at time and one half for a total comp time of 3.5 hours.

LEAVE CODES

Leave codes are used to record leave taken. The leave codes identified below shall be used to report leave taken.

Absence/Attendance Code	Description
Unpaid Absences	
AO	Approved Absence Without Pay
AW	Unauthorized Absence Without Leave
FL	Family Care Leave Without Pay With Benefits
HO	Unpaid Holiday
IM	Work-Related Injury LWOP/With Benefits/Medical Appointment
IO	Work-Related Injury LWOP/With Benefits
MO	Military Leave Without Pay With Benefits
PO	Parental Leave Without Pay With Benefits
SO	Sick Leave Without Pay With Benefits
SPO	Suspension
T	Tardiness
UOC	Unpaid Office Closing
UB	Union Business
Paid Absences	
A	Annual Leave
AI	Annual/Work Related Injury
ADMN	Administrative Leave
AM	Annual/Work Related Injury Medical Appointment
CIVL	Civil Leave
ED	Educational Leave With Pay
H	Holiday Leave
P	Personal Leave
PI	Personal Work Related Injury
PM	Personal Work Related Injury Medical Appointment
HI	Holiday/Work Related Injury
IE	Independent Medical Examination
M	Military Leave With Pay
ML	Work Related Disability Medical Appointment
MASG	Military Special Governor's Act(state of emergency)
P	Personal Leave
PI	Personal Work Related Injury
PM	Personal Work Related Injury Medical Appointment
POC	Paid Office Closing
S	Sick Leave
SB	Sick Bereavement
SC	Additional Sick Family Leave
SF	Sick Family Illness
SI	Sick Work Related Injury
SM	Sick Work Related Injury Medical Appointment

CLASS CODE AND JUSTIFICATION-CODE

Classification codes are used to record the classification that an employee is to be paid for when performing duties beyond their regular classification. The justification code is used to document the reason the employee was called upon to perform these duties. The codes identified below shall be used to report out of class pay.

OCC	Job Name	
10000030	Asst Hwy Mntnc Mgr	91330
10000052	Automotive Equip Frmn	93140
10000054	Automotive Mechanic	93110
10000055	Automotive Mechanic Spvr	93120
10000073	Carpenter	94010
10000129	Diesel Mechanic	93130
10000158	Electrician	94410
10000174	Equip Body Repairer Pntr	93080
10000230	Hwy Frmn 1	91010
10000231	Hwy Frmn 2	91020
10000232	Hwy Frmn 3	91030
10000234	Hwy Mntnc Mgr 1	91320
10000237	Hwy Sign Wkr	91110
10000252	Labor Frmn 1	90110
10000270	Mason	94210
10000287	Mntnc Rprmn 1	94610
10000288	Mntnc Rprmn 2	94620
10000313	Painter	94510
10000393	Tradesman Hlpr	93000
10000405	Trans Equip Opr A	91380
10000406	Trans Equip Opr B	91400
10000407	Trans Equip Opr Instr	92131
10000441	Welder	93410

Justification Codes	
2	Bereavement Leave
3	Call Out (Equipment Operation)
6	Disability Leave
C	Military Leave
D	Non-scheduled Leave (e.g. Sick, LWOP)
E	Other (specify)
G	Prescheduled Leave
K	Temporary Assignment
O	Vacancy
Q	Winter Service Assignment

OVERTIME REFUSED

SAP will record overtime refused for the purpose of overtime equalization. The overtime refused codes identified below shall be used to report overtime refused.

OT Equalization		
UA	OT Equalization Code - Unavailable Pre-approved	
NA	OT Equalization Code - No Answer not Pre-approved	
RF	OT Equalization Code - Refused OT	
NE	OT Equalization Code - Non-equalized Hours	
AD	OT Equalization Code - Positive Adjustment for employees new to unit	

EXAMPLE

The foreman calls an equipment operator to report two hours early to cover projected storm. The operator can not be reached by telephone.

Leave Code 1	Leave Hours 1	Refusal Code	Refused Hours	Offered By
		NA	2.0	Foreman #12

PAYROLL CODING CHARTS

Department Maintenance Forces frequently provide traffic control or otherwise assist District Personnel. A special cost function has been established for the sole use of county maintenance forces when performing these duties. Refer to page 3-31.

Special Services

612-2501-01	Installation of Historical Signs, Markers and Monuments	Man-hrs
612-2502-01	Maintenance of Historical Signs, Markers and Monuments	Man-hrs
612-2503-01	Maintenance of Scenic Protection Area Signs	Man-hrs
612-2504-01	Purchase and Place Roadside Tables	Man-hrs
612-2505-01	Erection of R.R. Flashing Signals (PUC Orders)	Man-hrs
612-2506-01	Reimbursement to Locals-Modification of Traffic Signals	Man-hrs
612-2507-01	Furnishing Gas and Oil to Others	Man-hrs
612-2508-01	Furnishing Gas and Oil from Automated Fuels System	Man-hrs
612-2509-01	Permit Work	Man-hrs
612-2510-01	Towing Disabled Vehicles	Man-hrs
612-2511-01	Adjustment of Unauthorized Driveways	Man-hrs
612-2512-01	Install Signs for Attraction	Man-hrs
612-2513-01	Install Signs - Driver License Sites	Man-hrs
612-2518-01	Other Costs Not Classified Above	Man-hrs

Special Maintenance/Construction Roads and Bridges

612-2521-01	Local Roads and Streets	Man-hrs
612-2522-01	Forestry Roads	Man-hrs
612-2523-01	State Park Roads	Man-hrs
612-2524-01	Institutional Roads	Man-hrs
612-2525-01	Conditioning Abandoned State Highways	Man-hrs
612-2526-01	Maintaining Temporary Routes	Man-hrs
612-2527-01	Interstate Bridges	Man-hrs
612-2529-01	Other Costs Not Classified Above	Man-hrs

Accident Damage (for RAR use only)

612-2531-01	Repair Damage to Guiderail	Feet
612-2532-01	Repair Damage to Signs	Sites
612-2533-01	Repair Damage to Roads, Bridges and Tunnels	Man-hrs
612-2534-01	Repair Damage to Impact Attenuators	Sites
612-2535-01	Repair Dept. Property Damaged by Vandalism	Man-hrs
612-2536-01	Accident Damage Inspector	Sites
612-2537-01	Repair Damage Dept Equipment	Man-hrs
612-2538-01	Traffic Control and/or Accident Clean-up	Man-hrs
612-2539-01	Other Costs Not Classified Above	Man-hrs

Posted Highways (Bonded Roads)

612-2561-01	Excess Maintenance	Man-hrs
612-2562-01	Review and Inspection	Man-hrs

Special Payments

612-9808-01	Support Services by Maintenance Forces	Man-hrs
612-9813-01	Great PA Cleanup	Man-hrs
612-9832-01	Construction of Buildings	Man-hrs
612-9848-01	Litter Brigade	Man-hrs
612-9849-01	Adopt-A-Highway	Man-hrs
612-9851-01	Hazardous Waste Removal	Man-hrs

Environmental

612-9866-01	Environmental Site Investigation	Man-hrs
612-9867-01	Environmental Site Inspection	Man-hrs

Construction Inspection Activities

612-9951-01	Project Management	Man-hrs
612-9952-01	Earthwork	Man-hrs
612-9953-01	Subbase	Man-hrs
612-9954-01	Bituminous Pavement and Base Course	Man-hrs
612-9955-01	Rigid Pavements	Man-hrs
612-9956-01	Drainage	Man-hrs
612-9957-01	Masonry	Man-hrs
612-9958-01	Landscaping	Man-hrs
612-9959-01	Structures	Man-hrs
612-9960-01	Shoulders	Man-hrs
612-9961-01	Guiderail, Median Barrier, Right-Of-Way Fence	Man-hrs
612-9962-01	Traffic Accommodations and Control	Man-hrs
612-9963-01	Computation and Preparation of Estimates	Man-hrs
612-9964-01	Materials and Soil Testing	Man-hrs
612-9965-01	Surveys, Staking, Etc.	Man-hrs

Other Miscellaneous Activities

612-9991-01	Photogrammetric Surveys	Man-hrs
612-9992-01	Relocation of Facilities	Man-hrs
612-9993-01	Bridge Safety Inspection	Man-hrs
612-9998-01	Laboratory Tests	Man-hrs

PROGRAM 618 - "AGILITY" - GENERAL MAINTENANCE

Roads - Unpaved

618-7112-01	Shaping	Miles
618-7113-01	Re-stabilization	SqYd
618-7114-01	Dust Palliative-Bit./Calcium Chloride/Other Prod.	SqYd
618-7114-02	Dust Palliative-Spot	SqYd
618-7115-01	Patch/Base Repair	SqYd

Roads - Paved

618-7121-01	Patching – Manual	Tons
618-7121-02	Patching - Manual (Emergency)	Tons
618-7121-04	Patching - Layered - Including Patch Machine	Tons
618-7122-01	Patching - Mechanical - Tow Paver	Tons
618-7122-02	Patching - Mechanical - Mixer Paver	Tons
618-7122-03	Patching - Mechanical - Paver Finisher	Tons
618-7122-04	Patching - Edge – Mechanical	Tons
618-7123-01	Surface Treatment - Mixer Paver	Gallons
618-7124-01	Surface Treatment - Liquid Bituminous – Mechanical	Gallons
618-7124-02	Surface Treatment - Sand Bleeding Roads	O Gallons
618-7124-09	Surface Treatment - Liquid Bituminous - Pre Hauling	O Gallons
618-7125-01	Surface Treatment - Plant Mix - Paver Finisher	Tons
618-7126-01	Base/Subbase Repair - Flex. Base - Light Duty	Tons
618-7126-02	Base/Subbase Repair - Flex. Base - Heavy Duty	Tons
618-7126-03	Base/Subbase Repair - Rigid Base	Tons
618-7126-04	Base/Subbase Repair – Widener	Tons
618-7127-01	Skin Patching - Liquid Bituminous – Manual	Gallons
618-7127-02	Skin Patching - Liquid Bituminous – Mechanical	Gallons
618-7127-03	Skin Patching - Liquid Bit. - Manual Dist. And Spray Wand	Gallons
618-7127-09	Skin Patching - Pre Hauling	O Gallons
618-7128-01	Crack Sealing - Bituminous Surface	Miles
618-7131-01	Leveling - Tow Pav./Pav. Finish – Mechanical	Tons
618-7131-02	Leveling - Mixer Paver – Mechanical	Tons
618-7131-09	Leveling - Mixer Paver - Pre Hauling	O Tons
618-7132-01	Milling - Bituminous Surfaces	SqYd
618-7132-02	Spot Milling Only	SqYd
618-7133-01	Recycling - Bituminous Surfaces	SqYd
618-7134-01	Slurry Seal and Ralumac	Tons
618-7135-01	Surface Treatment - Plant Mix - Paver, 1 1/2	Tons
618-7135-02	Surface Treatment - Plant Mix - ID 3	Tons
618-7136-01	Pavement Widening BCBC – Mechanical	Tons
618-7137-01	Pavement Widening Recycled Material – Mechanical	Tons
618-7141-01	Concrete Patching - Full Depth	SqYd
618-7141-02	Concrete Patching – Spalls	SqYd
618-7147-01	Joint Sealing Concrete Roads	Miles

618-7147-02	Joint Sealing Concrete Rds. - Pavement/Shoulders Separation	Lane Miles
618-7148-01	Stockpile Aggregate	Man-hrs
618-7151-01	Minor Risk Management/Safety	Sites

Shoulders - Unpaved and Side Approaches

618-7212-01	Grading – Mechanical	Miles
618-7213-01	Stabilization – Add. Material- Mechanical	Miles
618-7213-09	Stabilization - Pre Hauling	O Miles
618-7214-01	Dust Pallative Bituminous or Calcium Chloride	SqYd
618-7215-01	Cutting - Belt Loader	Miles
618-7215-02	Cutting - Front End Loader	Miles
618-7216-01	Upgrading - Paving Mechanized	Tons
618-7217-01	Stabilization - Add Material – Manual	Feet

Shoulders - Paved and Side Approaches

618-7221-01	Patching – Manual	Tons
618-7222-01	Patching - Mechanical - Plant Mix	Tons
618-7224-01	Surface Treatment - Mechanical - Liquid Bituminous	Gallons
618-7224-09	Surface Treatment _ Liquid Bituminous - Pre Hauling	O Gallons
618-7225-01	Driveway Adjustment	Feet
618-7226-01	Base/Subbase Repair - Light Duty	Tons
618-7226-02	Base/Subbase Repair - Heavy Duty	Tons
618-7227-01	Skin Patching - Manual - Liquid Bituminous	Gallons
618-7227-02	Skin Patching - Mechanical - Liquid Bituminous	Gallons
618-7227-09	Skin Patching - Pre Hauling	O Gallons
618-7228-01	Crack Sealing Lane	Miles
618-7232-01	Milling	SqYd

Drainage Cleaning, Repair or Replacement

618-7311-01	Cleaning - Inlet/Endwall/Basin - Manual/Mechanical	Each
618-7311-02	Cleaning - Inlet – Clogged	Each
618-7312-01	Cleaning - Ditch/Drain Chan. – Mechanical	Feet
618-7312-02	Cleaning - Ditch/Drain Chan. – Manual	Feet
618-7312-03	Cleaning - Swales – Mechanical	Feet
618-7314-01	Cleaning Pipes & Culverts	Feet
618-7315-01	Install Rock Lining	Feet
618-7321-01	Replace Inlet & Endwall – Manual	Each
618-7324-01	Replace Pipes and Culverts under 36" - Mech.	Feet
618-7324-02	Replace Pipes and Culverts 36" over - Mech.	Feet
618-7324-03	Replace/Install Parallel Pipe	Feet
618-7324-09	Replace Pipes and Culverts - Pipe Hauling	O Feet
618-7325-01	Repair/Replace Structure under 8' Length	Sites
618-7326-01	Repair Pipe and Culvert	Feet
618-7328-01	Install Subsurface Drain (U-Drain)	Feet

Roadway Section Restoration

618-7331-01	Side Dozing – Mechanical	Feet
618-7332-01	Repair/Install Gabions/Ret. Walls	Sites
618-7333-01	Repair Sink Holes/Slides - No Storms	Sites
618-7334-01	Graffiti Removal	Man-hrs

Major Damage and/or Disaster Restoration

618-7341-01	Major Slides	Man-hrs
618-7342-01	Major Structure Damage	Man-hrs

Storm Patrol

618-7351-01	Rain or Wind Patrol	Man-hrs

Bridge Maintenance and Repair

618-7425-01	Repair/Replace - Bridge Over 8' Length	Sites
618-7431-01	Clean/Flush – Deck	Sites
618-7431-02	Clean/Flush - Bearing and Super Structure	Sites
618-7431-03	Clean/Flush - Open Grid	Sites
618-7432-01	Painting – Spot	Sites
618-7432-02	Painting – Full	Sites
618-7433-01	Seal - Joint (Liquid Only)	Feet
618-7433-02	Repair Joints	Feet
618-7434-01	Repair/Replace - Guiderail/Median Barrier/Parapet	Feet
618-7435-01	Lubricate - Bearings	Each
618-7435-02	Repair/replace - Bearings	Each
618-7435-03	Repair/Replace - Pedestal/Seat	Each
618-7442-01	Repair/Replace - Approach Slabs	SqYd
618-7443-01	Repair/Replace - Deck	SqYd
618-7443-02	Repair/Replace - Sidewalk/Curb	SqYd
618-7444-01	Repair/Replace - Deck Drainage	
618-7446-01	Repair /Replace Superstructure Member	Each
618-7447-01	Repair/Replace - Truss Member	Each
618-7448-01	Repair/Replace - Backwalls	Cubic YD
618-7448-02	Repair/Replace - Substructure	Cubic YD
618-7448-03	Maintenance - Underpinning	Cubic YD
618-7450-01	Maintenance - Rejointing	Feet
618-7451-01	Repair/Replace - Slopewalls	SqYd
618-7452-01	Repair/Replace - Culverts	SqYd
618-7453-01	Erosion Protection - Stream Bed/Rock/Defl.	Cubic Yd
618-7453-02	Erosion Protection - Scour Hole Backfill	Cubic Yd
618-7453-03	Erosion Protection - Channel Cleaning	Cubic Yd
618-7454-01	Const./Install - Temporary Supports	Sites
618-7455-01	Repair/Replace - Slabs/Box Culvert	Sites
618-7459-01	Other - Bridge Activities	Sites

Tunnel Maintenance & Repair

618-7421-01	Wash/Clean – Various	Man-hrs
618-7422-01	Traffic Service – Various	Man-hrs
618-7423-01	Light System Service – Various	Man-hrs
618-7424-01	Electro – Mechanical Equip Maintenance	Man-hrs
618-7429-01	Other – Tunnel Activities	Man-hrs

Special Charges

618-7491-01	Hauling Non-Disabled Equipment - Lowboy Oper., Only	Man-hrs

Special Payments

618-9812-01	In-Service – Training	Man-hrs
618-9831-01	Condemnation	Man-hrs

PROGRAM 618 - "AGILITY" - WINTER TRAFFIC SERVICE

Snow Season Preparation, Snow Removal & Ice Control

618-7521-01	Plowing Snow, Spreading Anti-Skid, Chem. or Plow/Spread	Man-hrs
618-7522-01	Snow Removal - Non Storm Activities	Man-hrs
618-7523-01	Anti-Icing	Man-hrs

PROGRAM 618 - "AGILITY" - TRAFFIC SERVICE

Pavement Marking

618-7611-01	Traffic Line Painting – Mechanized Yellow	Miles
618-7612-01	Traffic Line Painting – Mechanized White	Miles
618-7613-01	Pavement Marking - Hand Operated Machine	Gallons
618-7614-01	Raised Pavement Markers	Sites
618-7615-01	Eradicate Paint Lines	Man-hrs
618-7616-01	Thermo Plastics	Man-hrs
618-7617-01	Repair paint Machines - Crew Only	Man-hrs
618-7619-01	Other - Pavement Marking Activities	Man-hrs

Signs

618-7621-01	Construction Detour & Other Temporary Signs	Sites
618-7622-01	Delineators, Hazard	Sites
618-7623-01	Sign Review	Miles
618-7624-01	Permanent Signs under 16 Sq. Ft.	Sites
618-7624-02	Permanent Signs 16 Sq. Ft. and Over	Sites
618-7625-01	SR & Segment Markers	Sites
618-7629-01	Other - Sign Activities	Man-hrs

Guiderail, Median Barrier and Impact Attenuation Devices

618-7631-01	Guiderail Repair - Mechanical – Cable	Feet
618-7631-02	Guiderail Repair - Mechanical - W/Beam	Feet
618-7631-03	Guiderail Repair/Replace – Manual	Feet
618-7632-01	Guiderail Removal	Feet
618-7639-01	Other - Guiderail, Median Barrier & Impact Att. Device Act.	Man-hrs

Lighting

618-7671-01	Service - Highway, Bridge & Sign Lighting Systems	Man-hrs

Traffic Services - Incidental Services

618-7681-01	Sweeping	Man-hrs
618-7689-01	Other - Incidental Service Activities	Man-hrs
618-7682-01	Deer Removal	Each

Special Payments

618-9812-01	In-Service Training	Man-hrs
618-9831-01	Condemnations	Man-hrs

Inspection – Surveys – Etc. – Dept. Forces

618-9964-01	Materials & Construction Inspection & Soils Testing	Man-hrs
618-9965-01	Surveys, Staking, Etc.	Man-hrs
618-9998-01	Laboratory Tests	Man-hrs

PROGRAM 618 - "AGILITY" - ROADSIDE

Vegetation Management

618-7711-01	Mowing	Acres
618-7711-02	Mowing – Mechanized	Acres
618-7711-03	Plant Growth Reg. (PGR's)	Acres
618-7712-01	Herb Application - Non-Select	Acres
618-7713-01	Herb Application - Broadcast Foliage	Acres
618-7714-01	Broadcast Growth Regulator (Fosamine)	Acres
618-7715-01	Brush & Select Tree Thin & Removal – Manual	Man-hrs
618-7715-02	Brush & Select Tree Thin & Removal - Mech.l	Man-hrs
618-7715-03	Herbicide Basal Bark & Dormant Stem	Man-hrs
618-7716-01	Seed & Soil Supplement	SqYd
618-7717-01	Wildflower Planting	SqYd
618-7719-01	Other Vegetation Management & Scenic Feature Activities	Man-hrs

Public Service Facilities

618-7731-01	Maintenance of Interstate all Weather Roadside Rest	Man-hrs
618-7732-01	Maintenance of all Other Roadside Rests & Table Sites	Man-hrs
618-7735-01	Roadside Litter Pickup and Debris Removal	Man-hrs
618-7735-02	Tire Casting Rem.	Man-hrs
618-7739-01	Other - Public Service Facility Activities	Man-hrs

Special Payments

618-9812-01	In-Service Training	Man-hrs
618-9831-01	Condemnations	Man-hrs

Inspection – Surveys – Etc. – Dept. Forces

618-9964-01	Materials & Construction Inspection & Soils Testing	Man-hrs
618-9965-01	Surveys, Staking, Etc.	Man-hrs
618-9998-01	Laboratory Tests	Man-hrs

PROGRAM 618 - "AGILITY" - MAINTENANCE AND OPERATION OF BUILDINGS AND GROUNDS

Maintenance and Operation Of Buildings And Grounds

618-1201-01	Maintenance of Buildings	Man-hrs
618-1202-01	Maintenance of Grounds	Man-hrs
618-1203-01	Repair or Alteration to Buildings	Man-hrs
618-1204-01	Repair or Alterations to Grounds	Man-hrs

Special Payments

618-9812-01	In-Service Training	Man-hrs
618-9829-01	Administration	Man-hrs

PROGRAM 618 - "AGILITY" - SPECIAL CHARGES

General Maintenance

618-2561-01	Services on Bonded Roads	Man-hrs
618-2562-01	Inspect Bonded Roads	Man-hrs
618-9001-01	Exchange Equipment	Man-hrs
618-9002-01	Exchange Materials	Man-hrs
618-9815-01	Engineering Services	Man-hrs
618-9817-01	Inspection Services	Man-hrs

PROGRAM 618 - "AGILITY" - EQUIPMENT MAINTENANCE

Service of Numbered Equipment

618-8113-01	Labor, Equip. & Material for Dispersion of Fuel, Oil, Etc	Man-hrs

PROGRAM 621 - FHWA DISASTER RECOVERY - ON SYSTEM ROADS

Emergency Disaster Restoration Department Forces

621-2541-01	Debris Clearance	Man-hrs
621-2542-01	Protective Measures	Man-hrs
621-2543-01	Emergency Road Repairs	Man-hrs
621-2544-01	Emergency Bridge Repairs	Man-hrs
621-2545-01	Emergency Shoulder Repairs	Man-hrs
621-2546-01	Emergency Pipe Installation	Man-hrs
621-2549-01	Other Costs	Man-hrs

Disaster Restoration by Contract

621-2554-01	Structures - Maintenance Contract	Man-hrs
621-2555-01	Roadways - Maintenance Contract	Man-hrs
621-2556-01	Shoulders - Maintenance Contract	Man-hrs
621-2559-01	Other - Maintenance Contract	Man-hrs

Special Payments

621-9808-01	Support Services by Maintenance Forces	Man-hrs 7
621-9832-01	Construction of Buildings	Man-hrs 7
621-9833-01	Demolition of Buildings	Man-hrs 7

NOTE: Special project coding instructions for this program can be found in the “Emergency Management Manual” Chapter 2, Section 2 – Coding.

Use of this program is limited to the following time period.

Period	**Authorization**
1-5 days	District Engineer
6-10 days	Dept. Disaster Recovery Coordinator
in excess of 10 days	FHWA Disaster Coordinator

PROGRAM 663 - FEMA DISASTER RECOVERY - OFF SYSTEM ROADS

Emergency Disaster Restoration - Department Forces

663-2541-01	Debris Clearance	Man-hrs
663-2542-01	Protective Measures	Man-hrs
663-2543-01	Emergency Road Repairs	Man-hrs
663-2544-01	Emergency Bridge Repairs	Man-hrs
663-2545-01	Emergency Shoulder Repairs	Man-hrs
663-2546-01	Emergency Pipe Installation	Man-hrs
663-2549-01	Other Costs	Man-hrs

Disaster Restoration by Contract

663-2554-01	Structures - Maintenance Contract	Man-hrs
663-2555-01	Roadways - Maintenance Contract	Man-hrs
663-2556-01	Shoulders - Maintenance Contract	Man-hrs
663-2559-01	Other - Maintenance Contract	Man-hrs

Special Payments

663-9808-01	Support Services by Maintenance Forces	Man-hrs
663-9832-01	Construction of Buildings	Man-hrs
663-9833-01	Demolition of Buildings	Man-hrs

NOTE: Special project coding instructions for this program can be found in the "Emergency Management Manual" Chapter 2, Section 2 – Coding.

Use of this program is limited to the following time period.

Period Authorization

1-5 days	District Engineer
6-10 days	Dept. Disaster Recovery Coordinator
in excess of 10 days	FHWA Disaster Coordinator

PROGRAM 711 - GENERAL MAINTENANCE

Roads - Unpaved

711-7112-01	Shaping	Miles
711-7113-01	Restabilization	SqYd
711-7114-01	Dust Palliative - Bit./Calcium Chloride/Other Prod.	SqYd
711-7114-02	Dust Palliative – Spot	SqYd
711-7115-01	Patch/Base Repair	SqYd

Roads - Paved

711-7121-01	Patching – Manual	Tons
711-7121-02	Patching - Manual (Emergency)	Tons
711-7121-04	Patching - Layered - Including Patch Machine	Tons
711-7121-05	Patching-Manual -Mechanized Cutting	Tons
711-7122-01	Patching - Mechanical - Tow Paver	Tons
711-7122-02	Patching - Mechanical - Mixer Paver	Tons
711-7122-03	Patching - Mechanical - Paver Finisher	Tons
711-7122-04	Patching - Edge – Mechanical	Tons
711-7122-05	Patching - Mechanical - Partial Depth	Tons
711-7123-01	Surface Treatment - Mixer Paver	Gallon
711-7124-01	Surface Treatment - Liquid Bituminous – Mechanical	Gallons
711-7124-02	Surface Treatment - Sand Bleeding Roads	O Gallons
711-7124-03	Surface Treatment-Slurry Seal & Ralumac & Nova Chip	Miles
711-7124-04	Surface Treatment-Liquid Bituminous-Seal Coat-Double Application	Gallons
711-7124-09	Surface Treatment - Liquid Bituminous - Pre Hauling	O Gallons
711-7125-01	Surface Treatment - Plant Mix - Paver Finisher	Tons
711-7126-01	Base/Subbase Repair - Flex. Base - Light Duty	Tons
711-7126-02	Base/Subbase Repair - Flex. Base - Heavy Duty	Tons
711-7126-03	Base/Subbase Repair - Rigid Base	Tons
711-7126-04	Base/Subbase Repair - Widener	Tons
711-7127-01	Skin Patch - Liquid Bituminous – Manual	Gallons
711-7127-02	Skin Patch - Liquid Bituminous – Mechanical	Gallons
711-7127-03	Skin Patch - Liq. Bit. Manual - Dist. & Spray Wand	Gallons
711-7127-09	Skin Patching - Pre Hauling	O Gallons
711-7128-01	Crack Sealing - Bituminous Surface	Lane Miles
711-7131-01	Leveling - Tow Pav./Pav. Finish – Mechanical	Tons
711-7131-02	Leveling - Mixer Paver – Mechanical	Tons
711-7131-09	Leveling - Mixer Paver - Pre Hauling	O Tons
711-7132-01	Milling - Bituminous Surfaces	SqYd
711-7132-02	Spot Milling Only	SqYd
711-7133-01	Recycling - Bituminous Surfaces	SqYd
711-7133-02	Recycling-Bituminous Surfaces-Central Plant-Mechanized	SqYd
711-7133-03	Recycling-Bituminous Surfaces-Full Depth(FDR)-Mechanized	SqYd
711-7133-09	Recycling – Pre Hauling	0 Sq Yd
711-7135-01	Surface Treatment - Plant Mix – Paver, 1 1/2	Tons
711-7136-01	Pavement Widening BCBC – Mechanical	Tons
711-7136-02	Pavement Widening, Cement Concrete	SqYd
711-7137-01	Pavement Widening Recycled Material – Mechanical	Tons
711-7141-01	Concrete Patching - Full Depth	SqYd
711-7141-02	Concrete Patching - Spalls	SqYd
711-7147-01	Joint Sealing Concrete Roads	Lane Miles
711-7147-02	Joint Sealing Concrete Rds. - Pavement/Shoulders Separation	Lane Miles
711-7148-01	Stockpile Aggregate	Man-hrs
711-7151-01	Minor Risk Management/Safety	Sites

Shoulders - Unpaved and Side Approaches

711-7212-01	Grading – Mechanical	Miles
711-7213-01	Stabilization - Add Material – Mechanical	Miles
711-7213-09	Stabilization - Pre Hauling	O Miles
711-7214-01	Dust Palliative Bituminous or Calcium Chloride	SqYd
711-7215-01	Cutting - Belt Loader	Miles
711-7215-02	Cutting - Front End Loader	Miles
711-7216-01	Upgrading - Paving Mechanized	Tons
711-7217-01	Stabilization - Add Material – Manual	Feet

Shoulders - Paved and Side Approaches

711-7221-01	Patching – Manual	Tons
711-7221-02	Patching-Plant Mix-Paver or Widener-Mechanized	Tons
711-7222-01	Patching - Mechanical - Plant Mix	Tons
711-7224-01	Surface Treatment - Mechanical - Liquid Bituminous	Gallons
711-7224-09	Surface Treatment - Liquid Bituminous - Pre Hauling	O Gallons
711-7225-01	Driveway Adjustment	Feet
711-7226-01	Base/Subbase Repair - Light Duty	Tons
711-7226-02	Base/Subbase Repair - Heavy Duty	Tons
711-7227-01	Skin Patching - Manual - Liquid Bituminous	Gallons
711-7227-02	Skin Patching - Mechanical - Liquid Bituminous	Gallons
711-7227-09	Skin Patching - Pre Hauling O	Gallons
711-7228-01	Crack Sealing	Lane Miles
711-7228-02	Crack Sealing- Concrete Surface-Manual	Lane Miles
711-7232-01	Milling	SqYd
711-7233-01	Recycling	SqYd

Drainage Cleaning, Repair or Replacement

711-7311-01	Cleaning - Inlet/Endwall/Basin - Manual/Mechanical	Each
711-7311-02	Cleaning - Inlet – Clogged	Each
711-7312-01	Cleaning - Ditch/Drain Chan. – Mech.	Feet
711-7312-02	Cleaning - Ditch/Drain Chan. – Manual	Feet
711-7312-03	Cleaning - Swales - Mech.	Feet
711-7314-01	Cleaning Pipes & Culverts	Feet
711-7315-01	Install Rock Lining	Feet
711-7321-01	Replace Inlet and Endwall – Manual	Each
711-7321-02	Repair Inlet & Endwall Manual	Each
711-7324-01	Replace Pipes & Culverts under 36" - Mech.	Feet
711-7324-02	Replace Pipes & Culverts 36" Over - Mech.	Feet
711-7324-03	Replace/Install Parallel Pipe	Feet
711-7324-04	Replace/Install Pipe Extensions Only	Feet
711-7324-05	Pipe Trenches-Trench Restoration-Manual	Tons
711-7324-09	Replace Pipes & Culverts - Pre Hauling	O Feet
711-7325-01	Repair/Replace Structure under 8' Length	Sites

711-7326-01	Repair Pipe & Culvert	Feet
711-7328-01	Install Subsurface Drain (U-Drain)	Feet

Roadway Section Restoration

711-7331-01	Side Dozing – Mechanical	Feet
711-7332-01	Repair/Install Gabions/Ret. Walls	Sites
711-7333-01	Repair Sink Holes/Slides - No Storms	Sites
711-7334-01	Graffiti Removal	Man-hrs

Major Damage and/or Disaster Restoration

711-7341-01	Major Slides	Man-hrs
711-7342-01	Major Structure Damage	Man-hrs

Storm Patrol

711-7351-01	Rain or Wind Patrol	Man-hrs

Bridge Maintenance & Repair

711-7425-01	Repair/Replace - Bridge over 8' Length	Sites
711-7431-01	Cleaning/Flush – Deck	Sites
711-7431-02	Cleaning/Flush - Bearing & Super Structure	Sites
711-7431-03	Cleaning/Flush - Open Grid	Sites
711-7432-01	Painting – Spot	Sites
711-7432-02	Painting – Full	Sites
711-7432-03	Painting Superstructure – Spot – Inorganic Zinc	Sites
711-7432-04	Painting Superstructure – Spot – Aluminum Mastic	Sites
711-7432-05	Painting Substructure – Spot – Inorganic Zinc	Sites
711-7432-06	Painting Substructure – Spot – Aluminum Mastic	Sites
711-7433-01	Seal - Joints (Liquid Only)	Feet
711-7433-02	Repair – Joints	Feet
711-7433-03	Repair/Replace – Joints – Strip Seal	Feet
711-7434-01	Repair/Replace Guiderail/Median Barrier/Parapet	Feet
711-7435-01	Lubricate – Bearings	Each
711-7435-02	Repair/Replace – Bearings	Each
711-7435-03	Repair/Replace - Pedestal/Seat	Each
711-7442-01	Repair/Replace - Approach Slab	SqYd
711-7442-02	Repair/Replace – Joints – Membrane Water Proofing	SqYd
711-7443-01	Repair/Replace – Deck	SqYd
711-7443-02	Repair/Replace - Sidewalk/Curb	SqYd
711-7443-03	Repair – Deck – Type 1	SqYd
711-7443-04	Repair – Deck – Type 2	SqYd
711-7443-05	Repair – Deck – Type 3	SqYd
711-7443-06	Repair – Deck – Other	SqYd
711-7444-01	Repair/Replace - Deck Drainage	Each
711-7446-01	Repair/Replace - Superstructure Member	Each

711-7447-01	Repair/Replace - Truss Member	Each
711-7448-01	Repair/Replace – Backwalls	Cubic Yd
711-7448-02	Replace/Repair – Substructure	Cubic Yd
711-7448-03	Maintenance – Underpinning	Cubic Yd
711-7448-04	Other Substructure	Cubic Yd
711-7450-01	Maintenance – Repointing	Feet
711-7451-01	Repair/Replace – Slopewalls	SqYd
711-7452-01	Repair/Replace – Culverts	SqYd
711-7452-02	Repair/Replace – Culverts Barrels/Baffles	SqYd
711-7453-01	Erosion Protection - Stream Bed/Rock/Defl.	Cubic Yd
711-7453-02	Erosion Protection - Scour Hole Backfill	Cubic Yd
711-7453-03	Erosion Protection – Channel Cleaning	Cubic Yd
711-7453-04	Other – Erosion Control	Cubic Yd
711-7454-01	Const./Install - Temporary Supports	Sites
711-7455-01	Repair/Replace Slabs/Box Culvert	Sites
711-7457-01	Brushing, Tree Temoval, etc. – Manual	Sites
711-7457-02	Brushing, Tree Removal, etc. – Mechanized	Sites
711-7459-01	Other Bridge Activities	Sites
711-7460-01	Off Bridge Drainage Improvements	Sites

Tunnel Maintenance & Repair

711-7421-01	Wash/Clean – Various	Man-hrs
711-7422-01	Traffic Services – Various	Man-hrs
711-7423-01	Light System Service – Various	Man-hrs
711-7424-01	Electro - Mech. Equipment Maintenance	Man-hrs
711-7426-01	Exterior – Various	Man-hrs
711-7427-01	Monitors – Various	Man-hrs
711-7429-01	Other - Tunnel Activities	Man-hrs

Special Charges

711-7491-01	Hauling Non-Disabled Equip. - Lowboy Oper. Only	Man-hrs

Special Payments

711-9808-01	Support Services by Maintenance Forces	Man-hrs
711-9812-01	In service – Training	Man-hrs
711-9831-01	Condemnation	Man-hrs

PROGRAM 712 - WINTER TRAFFIC SERVICE

Snow Season Preparation, Snow Removal & Ice Control

712-7521-01	Plow Snow, Spread Anti-Skid, Chem or Plow/Spreading Simultaneously -Truck Plowing – Grader Plowing	Man-hrs
712-7522-01	Snow and Ice Control - Other	Man-hrs

712-7523-01	Anti-Icing	Man-hrs
712-7524-01	Salt Brine Manufacture	Man-hrs

Special Payments

712-9812-01	In Service – Training	Man-hrs
712-9831-01	Condemnations	Man-hrs

Inspection - Surveys - Etc. - Dept. Forces

712-9964-01	Materials & Construction Inspection & Soils Testing	Man-hrs
712-9965-01	Surveys, Staking, Etc.	Man-hrs
712-9998-01	Laboratory Tests	Man-hrs

PROGRAM 713 - TRAFFIC SERVICE

Pavement Marking

713-7611-01	Traffic Line Painting – Mechanized Yellow	Miles
713-7612-01	Traffic Line Painting – Mechanized White	Miles
713-7613-01	Pavement Marking - Hand Operated Machine	Gallons
713-7614-01	Raised Pavement Markers	Sites
713-7615-01	Eradicate Paint Lines	Man-hrs
713-7616-01	Thermo Plastics	Man-hrs
713-7617-01	Repair Paint Machines - Crew Only	Man-hrs
713-7618-01	Pavement Marking Small Paint – Waterborne	Site
713-7618-02	Pavement Marking Small Paint – Durable	Site
713-7619-01	Other Pavement Marking Activities	Man-hrs

Signs

713-7621-01	Construction Detour & Other Temporary Signs	Sites
713-7622-01	Delineators, Hazard	Sites
713-7623-01	Sign Reviews	Miles
713-7624-01	Permanent Signs Under Signs Under 16 Sq. Feet	Sites
713-7624-02	Permanent Signs Over 16 Sq Feet	Sites
713-7625-01	SR & Segment Markers	Sites
713-7629-01	Other - Sign Activities	Man-hrs

Guiderail, Median Barrier and Impact Attenuation Devices

713-7631-01	Guiderail Repair - Mechanical – Cable	Feet
713-7631-02	Guiderail Repair - Mechanical - W/Beam	Feet
713-7631-03	Guiderail Repair/Replace – Manual	Feet
713-7631-04	Guiderail Upgrade Remove Cable/Add W Beam	Feet
713-7632-01	Guiderail Removal	Feet
713-7632-02	Guiderail Removal - Dept. Force/Contract Install	Feet
713-7639-01	Other - Guiderail, Median Barr. & Impact Attenuation Dev.	Man-hrs

Lighting

713-7671-01	Service - Highway, Bridge & Sign Lighting System	Man-hrs

Traffic Service - Incidental Services

713-7681-01	Sweeping	Man-hrs
713-7682-01	Deer Removal	Each
713-7683-01	Traffic Services-Homeland Security	Man-hrs
713-7689-01	Other - Incidental Service Activities	Man-hrs

Special Payments

713-9812-01	In Service – Training	Man-hrs
713-9831-01	Condemnation	Man-hrs

Inspection - Surveys - Etc. - Dept. Forces

713-9664-01	Materials & Construction Inspection & Soils Testing	Man-hrs
713-9965-01	Surveys, Staking, Etc.	Man-hrs
713-9998-01	Laboratory Tests	Man-hrs

PROGRAM 714 - ROADSIDE

Vegetation Management

714-7711-01	Mowing	Acres
714-7711-02	Mowing – Mechanized	Acres
714-7711-03	Plant Growth Reg. (PGR's)	Acres
714-7712-01	Herb Application - Non-Select	Acres
714-7713-01	Herb Application - Broadcast Foliage	Acres
714-7714-01	Broadcast Growth Regulators (Fosamine)	Acres
714-7715-01	Brush & Select Tree Thin, Tree Trim & Removal - Man.	Man-hrs
714-7715-02	Brush & Select Tree Thin, Tree Trim & Removal - Mech.	Man-hrs
714-7715-03	Herbicide Basal Bark & Dormant Stem	Man-hrs
714-7716-01	Seed & Soil Supplement	SqYd
714-7717-01	Wildflower Planting	SqYd
714-7719-01	Other - Vegetation Management & Scenic Feature Act.	Man-hrs

Public Service Facilities

714-7731-01	Maintenance of Interstate All Weather Roadside Rests	Man-hrs
714-7732-01	Maintenance of All Other Roadside Rests & Table Sites	Man-hrs
714-7735-01	Roadside Litter Pickup and Debris Removal	Man-hrs
714-7735-02	Tire Cassing Removal	Man-hrs
714-7739-01	Other - Public Service Facility Activities	Man-hrs

Special Payments

714-9812-01	In Service – Training	Man-hrs
714-9831-01	Condemnation	Man-hrs

Inspection - Surveys - Etc. - Dept. Forces

714-9964-01	Materials & Construction Inspection and Soils Testing	Man-hrs
714-9965-01	Survey, Staking, Etc.	Man-hrs
714-9998-01	Laboratory Tests	Man-hrs

PROGRAM 719 - MAINTENANCE ADMINISTRATION

Occupancy Permits/License

719-9141-01	Highway Occupancy Permits	Man-hrs
719-9142-01	Special hauling Permits	Man-hrs
719-9143-01	Bridge Occupancy Permits	Man-hrs
719-9149-01	Other Permit Costs	Man-hrs

Special Payments

719-9805-01	Employee Recognition Day	Man-hrs
719-9806-01	Value Engineering	Man-hrs
719-9809-01	Payroll Additive	Man-hrs
719-9811-01	Community Work Experience Program (CWEP)	Man-hrs
719-9812-01	In Service Training	Man-hrs
719-9815-01	Design	Man-hrs
719-9816-01	Materials Inspection	Man-hrs
719-9817-01	Construction	Man-hrs
719-9828-01	CMIC Payroll Charges & Credits	Man-hrs
719-9829-01	Administration	Man-hrs
719-9831-01	Condemnations	Man-hrs
719-9851-01	Hazardous Waste Inventory Removal	Man-hrs
719-9871-01	Drug and Alcohol Test	Man-hrs

PROGRAM 813 - COST FUNCTIONS - MAINTENANCE/OPERATION OF EQUIPMENT/MACHINERY

Service/Inspection of Numbered Equipment

813-8113-01	Labor, Equip. & Mat. For Dispension of Fuel, Oil, Etc.	Man-hrs

Miscellaneous

813-8372-01	Cleaning	Man-hrs
813-8375-01	Transportation	Man-hrs

PROGRAM 822 - MAINTENANCE AND OPERATION OF BUILDINGS AND GROUNDS

Maintenance and Operation of Buildings and Grounds

822-1201-01	Maintenance of Buildings	Man-hrs
822-1202-01	Maintenance of Grounds	Man-hrs
822-1203-01	Repairs or Alterations to Buildings	Man-hrs
822-1204-01	Repairs or Alterations to Grounds	Man-hrs

Special Payments

822-9811-01	Community Work Experience Program (CWEP)	Man-hrs
822-9812-01	In Service Training	Man-hrs
822-9828-01	CMIC Payroll Charges & Credits	Man-hrs
822-9829-01	Administration	Man-hrs
822-9831-01	Condemnations	Man-hrs

Environmental

822-9865-01	Environmental Stockpile QA's	Man-hrs
822-9866-01	Environmental Site Investigation	Man-hrs
822-9867-01	Environmental Site inspection	Man-hrs
822-9868-01	Storage Tank Inspection	Man-hrs

Other Miscellaneous Activities

822-9998-01	Laboratory Tests	Man-hrs

Whenever County Maintenance personnel work in the programs listed below, they will charge the following cost function and method:

XXX-9808-01 All Dept. Maintenance Force Costs

Prog	Description
211	Planning and Research - 100% State Funds
213	Planning and Research - State and Federal Funds
311	Engineering for Highway Construction - 100% State Funds
312	Engineering for Highway Construction - Special Projects-State & Federal Funds
313	Engineering for Highway Construction - State & Federal Matching A-B-C Funds
314	Engineering for Highway Construction - State & Federal Appalachia Funds
316	Engineering for Highway Construction - State & Federal Interstate Funds
317	Engineering for Safety Construction - 100% State Funds
318	Engineering for Safety Construction - State & Federal Funds
341	Right-of-Way for Highway Construction - 100% State Funds
342	Right-of-Way for Highway Construction Special Projects-State & Federal Funds
343	Right-of-Way for Highway Construction State & Federal Matching A-B-C Funds
344	Right-of-Way for Highway Construction - State & Federal Appalachia Funds
346	Right-of-Way for Highway Construction - State & Federal Interstate Funds
347	Right-of-Way for Safety Construction - 100% State Funds
348	Right-of-Way for Safety Construction - Special Projects-State & Federal Funds
361	Bridge Construction - 100% State Funds
362	Bridge Construction - State and Federal Funds
371	Highway Construction - 100% State Funds
372	Highway Construction - Special Projects-State & Federal Funds
373	Highway Construction - State & Federal Matching A-B-C Funds
374	Highway Construction - State & Federal Appalachia Funds
376	Highway Construction - State & Federal Interstate Funds
377	Safety Construction - 100% State Funds
378	Safety Construction - State and Federal Funds
381	3R Betterment - 100% State Funds
383	3R Betterment - State and Federal Funds
391	Bridge Rehabilitation - 100% State Funds
392	Bridge Rehabilitation - State and Federal Funds
613	Special Reimbursable Projects
614	Special Non-Reimbursable Projects
641	Control of Junkyards
651	Control of Outdoor Advertising

NOTE: The production unit for these activities is measured in MAN-HOURS.

DECLARED DISASTER RECOVERY WORK BY DEPARTMENT FORCES

Instructions for Declared Disaster Recovery Work by Department Forces

Department policy defines the payroll (crew or individual) as our "Source Document". In the event a question of legality arises and the situation is appealed, the contents of the payroll (Source Document) will be the determining factor. In other words, if the proof is not contained in the payroll the Federal Government may not reimburse the Department.

Foreman Responsibilities (or Acting Foreman):

- Itemize those activities on his Crew Daily Time Record.
- Provide the detailed information requested under the various headings.
- Follow the instructions outlined for routine maintenance activities.
- For DECLARED disaster related emergency work done by Department Force (PMO), the following additional reporting procedures apply:

    1 . Write "Disaster Project" at the top of each payroll used for recording DECLARED disaster related activities.

    2 . Make an entry for each disaster related work site, describing specifically what was completed on each site.

    3 . SEGMENTS and OFFSETS shall be shown for all DECLARED disaster emergency relief work.

    4 . The remarks section MUST be specific regarding the physical work accomplished by the crew (i.e., removed debris, placed barricade, back filled embankment washout, replaced 24" cross pipe,).

WHEN APPROACHING THE SCENE OF A MATERIAL SPILL

APPROACH CAUTIOUSLY. Resist the urge to rush in; you cannot help others until you know what you are facing. Approach the incident from an upwind direction. Do not walk into or touch any spilled material. Avoid inhaling fumes, smoke, and vapors. Do not assume that gases or vapors are harmless because of lack of smell.

IDENTIFY THE HAZARDS. As a first responder at the scene of a possible hazardous material incident, you must seek additional and more specific information. Placards, container labels, shipping papers, and/or knowledgeable persons on the scene are valuable information sources. If you cannot positively identify the cargo as non-hazardous, assume that it is a hazardous material.

SECURE THE SCENE without entering the immediate hazard area, do what you can to isolate the scene and assure the safety of people and the environment. Direct traffic away from the area.

OBTAIN HELP. Immediately after securing the scene, advise your maintenance manager or assistant manager to notify responsible agencies and to call for assistance. Do not leave the site. Wait for the experts. Do not clean up the accident site without the approval of your supervisors.

CALL-OUTS/TIME

A code has been developed to pay the employee the minimum 3 hours of straight time pay required for call outs. In order to determine if it can be used, the foreman must accurately identify callouts, to include the duration (number of hours worked coded to attendance type CT), as well as the actual start/stop times.

The CT code will calculate the wage type owed for the actual hours worked, and then supplement this with straight time to bring the combined total (actual hours worked/paid + supplemental straight time) to an equivalent of 3 hours of straight time pay.

Example 1

Employee's regular work shift is from 0700 to 1500 Monday through Friday. Employee is called out from 0100 to 0200. Employee returns home, and then reports for their regular shift from 0700 to 1530. On the Daily Crew Sheet/Diary, the foreman should document the actual call outs as attendance type CT (call time) for the duration of the call out.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Leave Code 1	Leave Hours 1
0013100	Michael Test PM A17		RT				7.5					
0013100	Michael Test PM A17		CT						1.0			

Example 2

Employee's regular work shift is from 0700 to 1530 Monday through Friday. Employee is called out from 0100 to 0200. Employee returns home and is subsequently called out from 0330 to 0500. Employee returns home, and then reports for their regular shift from 0700 to 1530.

On the Daily Crew Sheet/Diary the foreman should document the actual call outs as attendance type CT (call time) for the duration of each call out (will require one line item for each call out). They must also identify the real start/end times of each call out in the appropriate field. There will also be a third line item for the annual work shift (RT) for 7.5 hours. Start/end times are not required when working within shift or regular overtime.

The start and end times are critical in order for the timekeepers to accurately determine what wage types can be utilized to enter data in the system, as call time pay can not "pyramid" into the next period.

Personnel Number	Employee Name	Start/End Times	Attd Type	Pr Cd	Position	Justification Code	Hours WO1	O T	Hours WO2	O T	Hours WO2	Leave Hours 1
0013100	Michael Test PM A17		RT				7.5					
0013100	Michael Test PM A17		CT						1.5			
0013100	Michael Test PM A17		CT								1.5	

WO Ref	
	#2 called out for down tree SR 2001 from 0100 to 0200
	#3 called out for down tree SR 2030 from 0330 to 0500

In the example above, the employee would receive 7.5 hours of RT for their regular shift. The first call out would pay as 0.5 hours of straight time, and 0.5 hours of time and one half. This is the equivalent of 1.25 hours of straight time pay, so the system (if using CT) will generate 1.75 hours of supplemental straight time. Since there is only 1.5 hours between the end of the first call out and the next work period (2nd call out), the employee is only eligible for 1.5 hours of supplemental straight time, or a total of 2.75 hours for the first call out. Clock times identify the actual start/stop times are required for the timekeeper to determine if the CT code can be used. In this case, for the first call out, the timekeeper will perform a manual calculation for the supplemental straight time owed to the employee.

The second call out will pay as 1.5 hours of time and one half. This is the equivalent of 2.25 hours of straight time pay, so the system (if using CT) will generate 0.75 hours of supplemental straight time. Since there is 2 hours from the end of the second call out to the start of the next work period (actual work shift), the full amount can be paid and the CT code can be used.

This basic rule applied by the timekeeper is if the start of a call out is within 3 hours of the start of another work period. If this is the case, they must manually calculate the payment. If the amount of time between the start of the call out and the start of the next work period is 3 hours or more, they can simply input using the CT code.

CHAPTER 4: MATERIALS REPORTING ON PLANT MAINTENANCE PAYROLL

UNSPSC	SAP Material Number	COMMODITY CODE	GROUP NUMBER	DESCRIPTION 1
40142109	311108	563010040180	21	PIPE REINF CEMENT CONCRET 18INX4FT
40142109	311109	563010040300	21	PIPE REINF CEMENT CONCRET 30INX4FT
40142109	311110	563010040600	21	PIPE REINF CEMENT CONCRET 60INX4FT
40142109	311111	563010043000	21	PIPE END SECT REINF CEMNT CNCRT 30INX4FT
40142109	148590	563010080150	21	PIPE,CONCRETE,ROUND,15"
40142109	148591	563010080180	21	PIPE,CONCRETE,ROUND,18"
40142109	311112	563010080230	21	PIPE REINF CONCRET ROUND 18INX8FT
40142109	301373	563010080240	21	PIPE,CONCRETE,ROUND,27"
40142109	148592	563010080260	21	PIPE,CONCRETE,ROUND,24"
40142109	301374	563010080300	21	PIPE,CONCRETE,ROUND,33"
40142109	311113	563010080360	21	PIPE REINF CEMENT CONCRET 36INX8FT
40142109	148646	563010080420	21	PIPE,CONCRETE,ROUND,42"
40142109	311114	563010080480	21	PIPE REINF CEMENT CONCRET 48INX8FT
40142109	311115	563010080600	21	PIPE REINF CEMENT CONCRET 60INX8FT
40142109	148650	563010081500	21	SECTION END REINF CONCRET FOR8FT 15IN
40142109	148651	563010081800	21	SECTION END REINF CONCRET FOR8FT 18IN
40142109	148652	563010082400	21	SECTION END REINF CONCRET FOR8FT 24IN
40142109	148653	563010083000	21	SECTION END REINF CONCRET FOR8FT 30IN
40142109	301383	563010083300	21	SECTION END REINF CONCRET FOR8FT 33IN
40142109	148654	563010083600	21	SECTION END REINF CONCRET FOR8FT 36IN
40142109	148655	563010084200	21	SECTION END REINF CONCRET FOR8FT 42IN
40142109	148656	563010084800	21	SECTION END REINF CNCRET END FOR8FT 48IN
40142109	301385	563015000100	21	PIPE,CONCRETE,ELLIPTICAL,14"X23"
40142109	301386	563015000200	21	PIPE,CONCRETE,ELLIPTICAL,19"X30"
40142109	301388	563015000300	21	PIPE,CONCRETE,ELLIPTICAL,24"X38"
40142109	301390	563015000400	21	PIPE,CONCRETE,ELLIPTICAL,29"X45"
40142109	301391	563015000500	21	PIPE,CONCRETE,ELLIPTICAL,34"X53"
40142109	301392	563015000600	21	PIPE,CONCRETE,ELLIPTICAL,38"X60"
40142109	301394	563015000700	21	PIPE,CONCRETE,ELLIPTICAL,48"X76"
40142109	301396	563015000800	21	PIPE,CONCRETE,ELLIPTICAL,58"X91"
40142109	311116	563015000880	21	PIPE REINF CONCRET ELLIPT 14INx23INx8FT
40142109	301399	563015000900	21	PIPE,CONCRETE,ELLIPTICAL,END,14"X23"
40142109	301397	563015000970	21	PIPE,CONCRETE,ELLIPTICAL,63"X98"
40142109	301400	563015001000	21	PIPE,CONCRETE,ELLIPTICAL,END,19"X30"
40142109	301405	563015001300	21	PIPE,CONCRETE,ELLIPTICAL,END,34"X53"
40142109	301406	563015001400	21	PIPE,CONCRETE,ELLIPTICAL,END,38"X60"
40142109	301703	563015001500	21	PIPE,CONCRETE,ELLIPTICAL,END,48"X76"
40142109	301410	563015001600	21	PIPE,CONCRETE,ELLIPTICAL,END,58"X91"
40142109	301403	563015001710	21	PIPE,CONCRETE,ELLIPTICAL,END,27"X42"
40142100	137668	471015000050	25	PIPE,COR STL ARCH CUL,MTL CTD,17X13
40142100	137669	471015000100	25	PIPE,COR STL ARCH CUL,MTL CTD,21X15
40142100	137671	471015000150	25	PIPE,COR STL ARCH CUL,MTL CTD,24X18
40142100	137672	471015000200	25	PIPE,COR STL ARCH CUL,MTL CTD,28X20
40142100	137673	471015000250	25	PIPE,COR STL ARCH CUL,MTL CTD,35X24
40142100	137674	471015000300	25	PIPE,COR STL ARCH CUL,MTL CTD,42X29
40142100	137675	471015000350	25	PIPE,COR STL ARCH CUL,MTL CTD,49X33
40142100	137670	471015000400	25	PIPE,COR STL ARCH CUL,MTL CTD,57X38
40142100	137676	471015000450	25	PIPE,COR STL ARCH CUL,MTL CTD,64X43

UNSPSC	SAP Material Number	COMMODITY CODE	GROUP NUMBER	DESCRIPTION 1
40142100	136042	471015000500	25	PIPE,COR STL ARCH CUL,MTL CTD,83X57
40142100	310961	471015000600	25	PIPE COR STL ARCH CUL MTL CTD 71X47
40142100	137712	471015001050	25	PIPE,TYPE B,ARCH CUL,PLY CTD,17X13
40142100	137718	471015001100	25	PIPE,TYPE B,ARCH CUL,PLY CTD,21X15
40142100	137719	471015001150	25	PIPE,TYPE B,ARCH CUL,PLY CTD,24X18
40142100	277025	471015001200	25	PIPE,TYPE B,ARCH CUL,PLY CTD,28X20
40142100	137722	471015001250	25	PIPE,TYPE B,ARCH CUL,PLY CTD,35X24
40142100	277036	471015001300	25	PIPE,TYPE B,ARCH CUL,PLY CTD,42X29
40142100	137725	471015001350	25	PIPE,TYPE B,ARCH CUL,PLY CTD,49X33
40142100	137727	471015001400	25	PIPE,TYPE B,ARCH CUL,PLY CTD,57X38
40142100	137729	471015001500	25	PIPE,TYPE B,ARCH CUL,PLY CTD,64X43
40142100	136048	471015001550	25	PIPE,TYPE B,ARCH CUL,PLY CTD,83X57
40142100	310962	471015003050	25	PIPE COR STL PLAIN 15IN
40142100	137717	471015003100	25	PIPE,COR STL RND CUL,MTL CTD,18
40142100	137720	471015003200	25	PIPE,COR STL RND CUL,MTL CTD,24
40142100	137721	471015003300	25	PIPE,COR STL RND CUL,MTL CTD,30
40142100	137723	471015003350	25	PIPE,COR STL RND CUL,MTL CTD,36
40142100	137724	471015003400	25	PIPE,COR STL RND CUL,MTL CTD,42
40142100	137726	471015003450	25	PIPE,COR STL RND CUL,MTL CTD,48
40142100	137728	471015003500	25	PIPE,COR STL RND CUL,MTL CTD,54
40142100	137730	471015003550	25	PIPE,COR STL RND CUL,MTL CTD,60
40142100	136045	471015003650	25	PIPE,COR STL RND CUL,MTL CTD,72
40142100	310963	471015004050	25	PIPE CORR STL CUL ROUND POLYCOAT-B 15IN
40142100	137731	471015004100	25	PIPE,TYPE B,RND CUL,PLY CTD,18
40142100	137732	471015004200	25	PIPE,TYPE B,RND CUL,PLY CTD,24
40142100	137733	471015004250	25	PIPE,TYPE B,RND CUL,PLY CTD,30
40142100	137734	471015004300	25	PIPE,TYPE B,RND CUL,PLY CTD,36
40142100	137735	471015004350	25	PIPE,TYPE B,RND CUL,PLY CTD,42
40142100	137736	471015004400	25	PIPE,TYPE B,RND CUL,PLY CTD,48
40142100	137737	471015004450	25	PIPE,TYPE B,RND CUL,PLY CTD,54
40142100	137738	471015004500	25	PIPE,TYPE B,RND CUL,PLY CTD,60
40142100	136049	471015004600	25	PIPE,TYPE B,RND CUL,PLY CTD,72
40142100	310964	471015006010	25	PIPE CORR STL SQUASH 71X47
40142100	310965	471015031510	25	PIPE CORR STL COATED TYPE-C 17X13
40142100	310966	471015101050	25	PIPE CORR METAL POLYCOAT 84IN
40142100	310968	471015401060	25	PIPE PERFORATED 6IN DIA
40142100	310969	471015500050	25	SECTION END CORR CUL ROUND 15IN
40142100	300881	471015500100	25	PIPE,END SECTIONS,RND CUL,18
40142100	300882	471015500200	25	PIPE,END SECTIONS,RND CUL,24
40142100	137699	471015500300	25	PIPE,END SECTIONS,RND CUL,30
40142100	300883	471015500350	25	PIPE,END SECTIONS,RND CUL,36
40142100	137707	471015500400	25	PIPE,END SECTIONS,RND CUL,42
40142100	300884	471015500450	25	PIPE,END SECTIONS,RND CUL,48
40142100	137714	471015500500	25	PIPE,END SECTIONS,RND CUL,54
40142100	137716	471015500600	25	PIPE,END SECTIONS,RND CUL,60
40142100	137687	471015501050	25	PIPE,END SECTIONS,ARCH CUL,17X13
40142100	300885	471015501100	25	PIPE,END SECTIONS,ARCH CUL,21X15
40142100	277039	471015501150	25	PIPE,END SECTIONS,ARCH CUL,24X18

UNSPSC	SAP Material Number	COMMODITY CODE	GROUP NUMBER	DESCRIPTION 1
40142100	137695	471015501200	25	PIPE,END SECTIONS,ARCH CUL,28X20
40142100	137698	471015501250	25	PIPE,END SECTIONS,ARCH CUL,35X24
40142100	137702	471015501300	25	PIPE,END SECTIONS,ARCH CUL,42X29
40142100	137706	471015501350	25	PIPE,END SECTIONS,ARCH CUL,49X33
40142100	300886	471015501400	25	PIPE,END SECTIONS,ARCH CUL,57X38
40142100	277040	471015501450	25	PIPE,END SECTIONS,ARCH CUL,64X43
40142100	136046	471015501500	25	PIPE,END SECTIONS,ARCH CUL,83X57
40142100	310971	471017001210	25	PIPE COR STL PLAIN 12IN
40142100	310972	471018000400	25	PIPE ARCH STL CORR-ALUMINUM 49X33
40142100	311000	472000000100	25	PIPE END SECTION 18IN DIA
40142100	311001	472020000400	25	PIPE END SECTIONS ARCH 21X 15
40142315	276305	471015750050	26	COUPLING,COR POLY PIPE,18"DIA SPIN-ON
40142315	276306	471015750100	26	COUPLING,COR POLY PIPE,24"DIA
40142315	276307	471015750150	26	COUPLING,COR POLY PIPE,SNAP,6"
40142100	276301	471021000030	26	PIPE,COR POLY,TYPE C,18"DIA
40142100	276302	471021000050	26	PIPE,COR POLY,TYPE C,24"DIA
40142100	276308	471021000060	26	UNDERDRAIN,COR POLY PIPE,6"
40142100	276303	471021000070	26	PIPE,COR POLY,PERF,TYPE C,18"DIA
40142100	276304	471021000080	26	PIPE,COR POLY,PERF,TYPE C,24"DIA
40142100	310973	471021000090	26	PIPE POLY W BELL END SMT INS WL 12IN
40142319	305002	471021000100	26	TEE,COR POLY PIPE,SNAP,4" DIA
40141739	310974	471021000110	26	UNDERDRAIN PANEL PERF PIPE W GEOTEC 12IN
40141739	310975	471021000130	26	UNDERDRAIN PREFAB 12IN STRIP DRAIN ROL
40141739	310976	471021000140	26	UNDERDRAIN POLY PERF 3IN
40141739	310977	471021000150	26	UNDERDRAIN POLY PERF 4IN
40142308	305003	471021000160	26	WYE,COR POLY PIPE,SNAP,4" DIA
40142319	305006	471021000190	26	TEE,COR POLY PIPE,SNAP,6" DIA
40142308	305007	471021000200	26	WYE,COR POLY PIPE,SNAP,6" DIA
40142308	305030	471021000210	26	PIPE,COR POLY,TYPE S,HDPE,60" DIA
40142100	276448	471021001000	26	PIPE,COR POLY,TYPE S,15"DIA
40142100	276449	471021001050	26	PIPE,COR POLY,TYPE S,18"DIA
40142100	276450	471021001100	26	PIPE,COR POLY,TYPE S,24"DIA
40142100	276451	471021001150	26	PIPE,COR POLY,TYPE S,30"DIA
40142100	276452	471021001200	26	PIPE,COR POLY,TYPE S,36"DIA
40142100	276455	471021001250	26	PIPE,COR POLY,PERF,TYPE S,15"DIA
40142100	276460	471021001300	26	PIPE,COR POLY,PERF,TYPE S,18"DIA
40142100	276461	471021001350	26	PIPE,COR POLY,PERF,TYPE S,24"DIA
40142100	276462	471021001400	26	PIPE,COR POLY,PERF,TYPE S,30"DIA
40142100	276463	471021001450	26	PIPE,COR POLY,PERF,TYPE S,36"DIA
40142100	276453	471021001500	26	PIPE,COR POLY,TYPE S,42"DIA
40142100	276454	471021001550	26	PIPE,COR POLY,TYPE S,48"DIA
40142100	310978	471021001650	26	PIPE COR POLY TYPES 60IN DIA SMT INS WL
40142100	310979	471021002000	26	PIPE POLY END WL HARTMAN EW LL 8555
40142100	310985	471022000080	26	PIPE COR POLY SMTH INSD WL 8IN DIA X10FT
40142100	310986	471022000100	26	PIPE COR POLY SMTH INSD WL 12IN DIA
40142100	310967	471015250050	28	BANDS PIPE RND CUL 15"
40142100	300862	471015250100	28	BANDS,PIPE,RND CUL,18"
40142100	300863	471015250200	28	BANDS,PIPE,RND CUL,24

UNSPSC	SAP Material Number	COMMODITY CODE	GROUP NUMBER	DESCRIPTION 1
40142100	300864	471015250300	28	BANDS,PIPE,RND CUL,30"
40142100	300865	471015250350	28	BANDS,PIPE,RND CUL,36"
40142100	300866	471015250400	28	BANDS,PIPE,RND CUL,42"
40142100	300867	471015250450	28	BANDS,PIPE,RND CUL,48"
40142100	277038	471015250500	28	BANDS,PIPE,RND CUL,54
40142100	137715	471015250550	28	BANDS,PIPE,RND CUL,60
40142100	300871	471015250600	28	BANDS,PIPE,RND CUL,72"
40142100	300872	471015251050	28	BANDS,PIPE ARCH CUL,17X13
40142100	300873	471015251100	28	BANDS,PIPE ARCH CUL,21X15
40142100	300874	471015251150	28	BANDS,PIPE ARCH CUL,24X18
40142100	137693	471015251200	28	BANDS,PIPE,ARCH CUL,28X20
40142100	300875	471015251250	28	BANDS,PIPE ARCH CUL,35X24
40142100	300876	471015251300	28	BANDS,PIPE ARCH CUL,42X29
40142100	300877	471015251350	28	BANDS,PIPE ARCH CUL,49X33
40142100	300878	471015251400	28	BANDS,PIPE ARCH CUL,57X38
40142100	300879	471015251450	28	BANDS,PIPE ARCH CUL,64X43
40142100	300880	471015251500	28	BANDS,PIPE ARCH CUL,83X57
40142315	276305	471015750050	28	COUPLING,POLY PIPE,SPIN,18"
40142315	276307	471015750150	28	COUPLING,COR POLY PIPE,SNAP,6"
40142315	310970	471015750170	28	COUPLING,COR POLY PIPE,SNAP,3"
40142315	276464	471015750200	28	COUPLING,COR POLY PIPE,15"DIA
40142315	276465	471015750300	28	COUPLING,COR POLY PIPE,18"DIA
40142315	276476	471015750400	28	COUPLING,COR POLY PIPE,24"DIA
40142315	276477	471015750500	28	COUPLING,COR POLY PIPE,30"DIA
40142315	276478	471015750600	28	COUPLING,COR POLY PIPE,36"DIA
40142315	276479	471015750700	28	COUPLING,COR POLY PIPE,42"DIA
40142315	276480	471015750800	28	COUPLING,COR POLY PIPE,48"DIA
40142315	311002	473015500120	28	COUPLING COR POLY PIPE SNAP ON 36IN DIA
40142100	311003	473015701600	28	BANDS PIPE COR 71X47
40142100	311004	473015701620	28	BANDS PIPE CULVERT INC CSP BD AL T2 84IN
40142100	311005	473099990200	28	BANDS PIPE 78IN METAL CONTECH
30121601	302218	561020000490	31	ASPHALT,SP25MM,SRL=ANY,ANYESALS,PG64-22
30121601	301921	561020000500	31	ASPHALT,SP9.5MM,SRL=M/G,0-3MESAL,PG64-22
30121601	301922	561020000510	31	ASPHALT,SP9.5MM,SRL=H,.3-3MESAL,PG64-22
22101611	301923	561020000520	31	ASPHALT,SP9.5MM,SRL=E,3-30MESAL,PG64-22
22101611	301926	561020000550	31	ASPHALT,SP12.5MM,SRL=E,3-30MESAL,PG64-22
30121601	301927	561020000560	31	ASPHALT,SP25MM,0-.3MESAL,PG64-22
30121601	301928	561020000570	31	ASPHALT,SP25MM,.3-3MESAL,PG64-22
30121601	301929	561020000580	31	ASPHALT,SP25MM,COURSE,3-30MESAL,PG64-22
22101611	311084	561020000590	31	ASPHALT,SP19MM,SRL=ANY,ESALS,PG64-22
30121601	301931	561020000600	31	ASPHALT,SP19MM,.3-3MESAL,PG64-22
30121601	301932	561020000610	31	ASPHALT,SP19MM,<0.3MESAL,PG64-22
30121601	301933	561020000620	31	ASPHALT,SP37.5MM,3-30MESAL,PG64-22
30121601	301934	561020000630	31	ASPHALT,SP9.5MM,SRL=H,0-3MESAL,PG64-22
30121601	301936	561020000650	31	ASPHALT,SP9.5MM,SRLMG, .3-3MESAL,PG64-22
30121601	301937	561020000660	31	ASPHALT,SP9.5MM,SRL=E,.3-3MESAL,PG64-22
30121601	301938	561020000670	31	ASPHALT,SP9.5MM,SRL=ANY,ESAL=ANY,PG64-22
30121601	301939	561020000680	31	ASPHALT,SP9.5MM,SRL=E,3-30MESAL,PG76-22

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30121601	301940	561020000690	31	ASPHALT,SP19MM,SRL=ANY,.3-3MESAL,PG64-22
30121601	301941	561020000700	31	ASPHALT,SP25MM,SRL=ANY,.3-3MESAL,PG64-22
22101611	311085	561020000710	31	ASPHALT,SP19MM,SRL=ANY,ESAL=ANY,PG64-22
30111601	311086	561020001820	31	BIT MAT PLANT MIXED FB-2 WEARING MOD
30121601	301942	561020002000	31	ASPHALT,SP9.5MM,SRL=L,0-3MESAL, PG64-22
30121601	301943	561020002050	31	ASPHALT,SP9.5MMF,SRL=G,0-.3MESAL,PG64-22
30121601	301945	561020002100	31	ASPHALT,SP9.5MM,SRL=ANY.3-3MESAL,PG64-22
30121601	301944	561020002150	31	ASPHALT,SP9.5MMF,SRL=G,.3-3MESAL,PG64-22
30121601	301946	561020002200	31	ASPHALT,SP9.5MM,SRL=L,.3-3MESAL,PG64-22
30121601	301951	561020002300	31	ASPHALT,SP12.5MM,SRL=H,0-3MESAL,PG64-22
30121601	301952	561020002500	31	ASPHALT,SP19MM,SRL=ANY,0-3MESAL,PG64-22
30121601	301953	561020002550	31	ASPHALT,SP25MM,SRL=ANY,0-3MESAL,PG64-22
22101611	311087	561020002700	31	ASPHALT,SP9.5MM,SRL=H.3-3MESAL,PG76-22
30121601	311095	561020006220	31	BITUMEN PMIXED ID-2A WEAR SRL E H
30121601	286836	561020003500	32	BITUMEN, STOCKPILE COLDPATCH 485 CAT 1
30121601	311088	561020003510	32	BITUMEN PMIXED STKPATCH COLD CAT3 BONDX
30121601	286837	561020003520	32	BITUMEN, STOCKPILE COLDPATCH 485 CAT 2
30121601	311089	561020003540	32	BITUMEN PMIXED STKPATCH COLD LATEXMOD
30121601	311090	561020003550	32	BITUMEN PMIXED STKPATCH COLD TYPE-UPM
30121601	311091	561020003560	32	BITUMEN PMIXED STKPATCH COLD LATEX HEI-W
30121601	311092	561020003570	32	BITUMEN PMIXED STKPATCH COLD GEN HEI-WAY
30121601	311093	561020003580	32	BITUMEN PMIXED STKPATCH COLD TYPEQPR2000
30121601	311077	561000000000	33	BITUMEN AGGREGATES SAND+LIMESTONE
30110000	242148	561005000100	33	AGGREGATE,# 10
30110000	242149	561005000110	33	AGGREGATE,# 9
30110000	242150	561005000150	33	AGGREGATE,# 8,LBW 1%,TYPE A,SRL=H
30110000	242151	561005000200	33	AGGREGATE,# 8,TYPE A
30110000	242152	561005000230	33	AGGREGATE,# 8,LBW 2.0%,SRL=H
30110000	242153	561005000250	33	AGGREGATE,# 8,MIN 20% PASS # 4
30110000	242154	561005000280	33	AGGREGATE,# 8,MIN 20% PASS # 4,SRL=M
30110000	242165	561005000290	33	AGGREGATE,# 8,LBW 2.0%
30110000	242166	561005000300	33	AGGREGATE,#67,TYPE A
30110000	242167	561005000310	33	AGGREGATE,# 8,LBW 1.0%,SRL=E
30110000	242168	561005000320	33	AGGREGATE,# 8,LBW 1.0%,SRL=G
30110000	242169	561005000330	33	AGGREGATE,# 8,LBW 1.0%,SRL=M
30110000	242170	561005000340	33	AGGREGATE,# 8,LBW 1.0%
30110000	242171	561005000350	33	AGGREGATE,# 67,LBW 2.0%
11111600	311078	561005000370	33	AGGREGATE,# 8,LBW 1.0% SRL=H
30110000	242173	561005000380	33	AGGREGATE,# 67,LBW 1.0%
30110000	242174	561005000390	33	AGGREGATE,# 8,TYPE A,LBW 1.0%
30110000	242175	561005000400	33	AGGREGATE,2RC
30110000	242176	561005000410	33	AGGREGATE,# 8,SRL-E&H,SRL=E&M,SRL=E&G
30110000	242177	561005000420	33	AGGREGATE,# 8,SRL=E
30110000	242179	561005000450	33	AGGREGATE,# 8,AASHTO,TYPE C OR BETTER
30110000	242181	561005000500	33	AGGREGATE,# 57
30110000	242182	561005000510	33	AGGREGATE,# 9,LBW 1.0%
30110000	242183	561005000520	33	AGGREGATE,# 9,LBW 2.0%
30110000	242184	561005000540	33	AGGREGATE,# 9,TYPE A,LBW 1.0%,SRL=H

UNSPSC	SAP Material Number	COMMODITY CODE	GROUP NUMBER	DESCRIPTION 1
30110000	242186	561005000570	33	AGGREGATE,GABION STONE,PUB408,SEC626
30110000	242187	561005000580	33	AGGREGATE,ROCKLINING,RIPRAP ASST,SEC 850
30110000	242188	561005000590	33	AGGREGATE-7 ROCKLINING
30110000	242189	561005000600	33	AGGREGATE,# 57,MINIMUM 40% PASSING 1/2"
30110000	242190	561005000610	33	AGGREGATE-3 ROCKLINING
30110000	242191	561005000620	33	AGGREGATE-4 ROCKLINING
30110000	242192	561005000630	33	AGGREGATE-5 ROCKLINING
30110000	242193	561005000640	33	AGGREGATE-6 ROCKLINING
30110000	242194	561005000650	33	AGGREGATE-8 ROCKLINING
30110000	242195	561005000670	33	AGGREGATE,# 57,AAHSTO,TYPE C OR BETTER
30110000	242196	561005000680	33	AGGREGATE,# 3
30110000	242197	561005000700	33	AGGREGATE,# 1
30110000	242198	561005000800	33	AGGREGATE,2A
30110000	242199	561005000900	33	SAND,TYPE A
30110000	242200	561005000910	33	SAND,TYPE B
30110000	242201	561005000920	33	SAND,TYPE C
11111600	311080	561005009000	33	AGGREGATES NO-COST #8
30111601	137757	561025000400	35	BITUMEN,LIQUID E-1 PRIME
30121601	303868	561025000450	35	BITUMEN,LIQUID,CMS-2S,E12
30111601	137758	561025000500	35	BITUMEN,LIQUID RS-2/CRS-2 (E-2/E-3)
30111601	137759	561025000550	35	CALCIUM LIGONOSULFATE,NONBITUMEN LIQ 1:1
30111601	311096	561025000560	35	BITUMEN EMULS RESIN PETROL DIL3:1
30111601	137761	561025000570	35	BITUMEN, LIQ HFMS EMUL E-11 RECYCLING
30111601	137762	561025000600	35	BITUMEN, LIQ MS-2/CMS-2 E-4/E-5
30111601	137763	561025000650	35	BITUMEN, MS-2/CMS-2 COLD RECYCLE E4/E5
30121500	301959	561025000850	35	BITUMEN, USE W/FB MODIFIED PAVING MAT
30111601	137766	561025001800	35	BITUMEN, AE-T EMULS ASPHALT TACK COAT
30111601	137767	561025001810	35	BITUMEN, LIQ CSS-1H COLD RECYCLING E 8
30111601	311097	561025001830	35	BITUMEN KOLDSEAL
30111601	137768	561025001900	35	BITUMEN, LIQUID PG64-22 (AC-20)
30111601	311098	561025002000	35	BITUMEN SR TACKCOAT
30111601	137769	561025002600	35	BITUMEN, RS-2PM/CRS-2PM POLY MODIFIED
30111601	137770	561025002800	35	BITUMEN, ASPHALT EMULSION PRIME (AEP)
30121500	301960	561025002900	35	BITUMEN,EMULSIFIED DUST PALLATIVE EDP
30111601	311094	561020004000	39	BITUMEN MILLED REUSABLE
30111601	137896	568040000400	39	SEALER,JOINT,MOD AASHTO 173,TYP2,CONC
30130000	311154	568040001100	39	SEALER CRACK AC-FIBERBLOCK
30111601	137894	568040001300	39	SEALANT,JOINT,LOW MOD,ASTMD3405,TYP3,
30111601	137895	568040001400	39	SEALER,JOINT,MOD AASHTO 173,TYP4,CONC
12000000	311214	681074231000	39	SALT BRINE SUMMER DUST PALLATIVE
30130000	311270	811544000450	39	CARTON 5-1/2X3-1/2"X 9-3/4 RSC #200TEST
12000000	311215	681074231250	41	SALT SOLAR CRYSTALS EVAP BRINEPROD
12141806	141194	681081200400	41	SODIUM CHLORIDE,(ROCK SALT)
12000000	311216	681081200600	41	SODIUM BRINE LIQUID WINTER
51182401	131270	681023900150	42	CALCIUM CHLORIDE,50 LB BAG
12140000	311212	681023900200	42	CHLORIDE CALCIUM BULK TYPE1
12140000	311213	681023900600	42	CHLORIDE CALCIUM LIQUID INHIBITOR CORROS
12000000	141183	681023900605	42	CALCIUM CHLORIDE,LIQUID

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51171632	141184	681023900700	42	MAGNESIUM CHLORIDE,LIQUID
46161506	242203	561015000100	43	ANTI-SKID,TYPE 1
31190000	242205	561015000200	43	ANTISKID,TYPE 2
46161506	242206	561015000300	43	ANTISKID, TYPE3
46161506	242207	561015000310	43	ANTI-SKID, TYPE3A
46161506	242208	561015000320	43	ANTI-SKID, TYPE3B
31190000	311081	561015000400	43	ANTISKID TYPE4 INCIN ANTH REF
46161506	242211	561015000600	43	ANTI-SKID,TYPE 6S
31190000	311082	561015000800	43	ANTISKID TYPEAS2
31190000	311083	561015000900	43	ANTISKID TYPEAS1
30101503	310958	401005000550	72	ASSEMBLY CABLE BCT
31162500	310959	401005001000	72	BRACKET SPRING OFFSET
31162500	310960	401060001100	72	BRACKET SPRING OFFSET USED
30103100	311120	566025001460	72	POST 2W XTRA-LENGTH W/O-DEFLECT-PLATE
30102204	137830	566027000050	72	STEEL PLATE,TYP 2-A,2-B,2-C,2-S
30103100	137831	566027000110	72	RAIL,RUB,COLD FORMED CHANNEL,6"X3"X10G
30103100	137832	566027000200	72	STEEL SPACE TUBE
30103100	137833	566027000210	72	RAIL,W BEAM ELEMENT,3HOLE,12G,2A,2B,2C
30103100	137834	566027000220	72	RAIL,W BEAM ELE,5HOLE,12G,2A,2B,2V,2S,2W
30103100	137835	566027000250	72	RAIL,WBEAM BACK PLATE,TYP 2A,2B,2C,2S,
30103100	137836	566027000260	72	TERMINAL SECTION FLARED
30103100	137837	566027000270	72	RAIL,ELEMENT END TREATMENT,10 HOLE
30103100	137887	566027000280	72	RAIL ELEMENT,SHOP CURVD,FOR DRIVE & OPE
30102204	137839	566027000290	72	STEEL PLATE,8 HOLE,1/4X3X27
30103100	137840	566027000300	72	RAIL,WBEAM ELE CONVEX,TYP 2A,2B,2S
30103100	137841	566027000400	72	TERMINAL,SECTION BRIDGE CONNECTION
30103100	137842	566027000600	72	TERMINAL,SEC DOUBLE OUTSD,TYP 2A,2B,2S
30103100	137843	566027000710	72	TERMINAL,SECT,SGL OUTSD,TYP 2A,2B,2S
30103100	137844	566027000720	72	TERMINAL,SEC,SGL INSIDE,TYP 2A,2B,2S
30103100	137845	566027000750	72	SQUARE WASHER,TYP 2W & 2WM
31161600	137846	566027000800	72	BOLT,MOUNTING W/NUT,TYP 2W & 2WM
30103100	137848	566027000900	72	SECTION,TERMINAL END,BCT ENT TREATMENT
31162500	137849	566027000950	72	BRACKET,TO POST BOLT W/NUT,TYP 2A,2B,2C,
30130000	137851	566027001050	72	PLATE,BEARING,BCT END TREATMENT
31161600	137852	566027001100	72	BOLT,POST W/NUT,TYP 2A,2B,2C,2S
31161600	137853	566027001150	72	BOLT,POST W/NUT,RUBBING RAIL,TYP 2S
30103100	137854	566027001200	72	POST,STRUCTURE MOUNTED,W8X15
31161600	137855	566027001250	72	SPLICE 5/8X1 1/4 2A 2B 2C 2S 2W 2WM
30103100	137856	566027001300	72	TERMINAL SEC,MOD BRIDGE CON,BCT ENT TREA
31161600	137857	566027001350	72	BOLT,SUPPORT,DOUBLE NUTS,TYP 2W,2M
31161600	137858	566027001400	72	BOLT,ANCHOR,W/NUT & WASHER,7/8"X18" FOR
30103100	137860	566027001500	72	ANCHOR BOLT ASSY
30103100	137861	566027001550	72	POST,EXTRA LENGTH,2S
30103100	137862	566027001600	72	POSTS,TYP 2A,2B,2C
30103100	137863	566027001650	72	POST,WEAK W/DEFLECT PLATE,TYP 2WM
30103100	137864	566027001700	72	POST,STANDARD,TYP 2S
30103100	137865	566027001750	72	POST,STRONG,MULTI PUNCHES,W6X8.5
30103100	295552	566027001760	72	POST,WEAK,TYP2W&2WC,72",W/ODEFLECTIONPL

UNSPSC	SAP Material Number	COMMODITY CODE	GROUP NUMBER	DESCRIPTION 1
30103100	137866	566027001800	72	POST,WEAK TYPE,2W,2WC
30103100	137867	566027001850	72	POST,WEAK W/DEFLECT PLATE,TYP 3WM,3WMC
30103100	137868	566027001900	72	POST,BCT FOUNDATION POST,TYP 2S
30103100	311121	566027001910	72	POST GALV STRONG MULTI-PUNCH 6X8.5#X7L
30103100	137869	566027001950	72	POST,BCT TERMINAL POST,TYP 2S
31162500	137870	566027002000	72	BRACKET,OFSET,MULTIPUNCHD,W6X8.5 OR W6X9
31162500	137871	566027002050	72	BRACKET,OFFSET,TYP 2A,2B,2C,2S
31162500	137872	566027002100	72	BRACKET,ANCHOR ROTATING ASSY
30103100	137873	566027002200	72	BASKET,ANCHOR,8"
30103100	137874	566027002250	72	CABLE,ASSY,TYPE,2S,OR,BCT
30103100	137876	566027002350	72	BLOCK,OFFSET,21-3/4" LONG
30103100	311122	566027002360	72	BLOCK OFFSET COMPOSITE LGHTWGHT TYPED-3
30103100	137877	566027002400	72	SPLICE PLATE,RUBBING RAIL
30103100	137878	566027002450	72	RAIL,RUB END DETAIL W/O INLET 5'-5 1/2"
30130000	137880	566027002550	72	PLATE,BASE,"B",9 1/8X11"
30130000	137881	566027002600	72	PLATE,BASE,"C",CONC ANCHOR,6-1/2"X6 3/4"
30103100	137883	566027002700	72	END SECTION,BCT,COMPLETE UNIT
30103100	137884	566027002750	72	RAIL ELEMENT,3H,6'3"SPACING TO ACCEPT 8H
30103100	137885	566027002800	72	RAIL ELEMENT,4HOLE @4'2"SPACING
30103100	137886	566027002850	72	W BEAM RAIL ELEMENT CONVEX,TYP 2A,2B,2S,
30103100	137838	566027002900	72	RAIL ELEMENT,SHOP CURVD R=10'-19"
30103100	137888	566027002950	72	POST,END SUP ANGLE W/BOLTS & NUTS,RC53
30103100	137889	566027002970	72	POST,W/O DEFLECT PLATE,2W 63"L,RC53,SHT1
31162500	137890	566027003050	72	BRACKET,WOOD OFFSET(USE W/WOOD POST)
31162500	137891	566027003100	72	BRACKET,WOOD OFFSET(USE W/STEEL POST)
31161600	137892	566027003150	72	BOLT, W/WASHER & NUT,GALV,5/8"X9",
31161600	137893	566027003200	72	BOLT, W/WASHR & NUT,GALV,5/8"X18",USE W/
31161600	295550	566027003210	72	BOLT W/ WASHER&NUT,GAKVANIZED,5/8"X10"
31161600	295551	566027003220	72	BOLT,MNTNGW/1FLTWASHER&2NUTS,5/1"X2-1/2
31161600	295553	566027003230	72	BOLT,HEXW/2WASHERS&1NUT,3/4"X4-1/2"
31161600	295554	566027003240	72	BOLT,HEX 5/16",2W,2WC,2WM
30103100	311123	566027003260	72	POST WOOD 6INX8INX6FT
31161600	295555	566027003270	72	BOLT ASSY. POST,5/8"X2",2A,2B,2C,2S
30103100	311124	566027003350	72	PANEL SRT-1 34G 12/12FT6/S
30103100	311125	566027003360	72	PANEL SRT-2 39G 12/12FT6/S
30103100	311126	566027003380	72	BUFFER ROLLED 907G 12
30103100	311128	566050000100	72	POST RAILING BRIDGE ALUM TYPE/ST-140
30103100	311129	566050000200	72	POST RAILING BRIDGE ALUM TYPE/BC-312
30103100	311130	566060000250	72	POST USED TYPE-1A/B/2A 5FT9IN
30103100	311131	566060001400	72	POST USED TYPE-2S/SC W6 X 8.5
30103100	311132	566060001410	72	POST USED MULTI-PURP STRONG W6X8.5
30103100	311133	566060001430	72	POST USED MULTI-PURP STRONG W6X15
30103100	311134	566060001500	72	POST USED W/DEFLECT-PLATE TYPE-2W/WC
30103100	311135	566060001510	72	POST USED BARRIER TYPE-2WM S3X5.7
30103100	311136	566060001810	72	POST USED W/DEFLECT-PLATE TYPE-3WMC
30103100	311137	566060001820	72	POST USED MULTI-PURP WEAK S3X5.7
30103100	311138	566060003000	72	POST USED BRIDGE STRUCT-MOUNT W8X15
30103100	311139	566539000750	72	COVER PLASTIC NOSE FOR-2UNITS 20-20-271

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30103100	311140	566539004600	72	CARTRIDGE HEX FOAM TYPE-51
30103100	311141	566539200010	72	TERMINAL END GUIDERAIL ET2000 COMPLETE
30101503	311142	566542001300	72	ASSEMBLY SUPPORT-LEG FLEX-BELT SAFETY
30103100	311372	951510000500	72	SHIMS 5INX24IN
30103100	311401	952025000500	72	TERMINAL MODIFIED SECTION BRIDGE
30103100	311402	952025000700	72	TERMINAL SECTION FACE
30103100	311403	952025000910	72	RAIL CONCAVE TYPE-2B 10-150FTRADIUS
30103100	311404	952025000950	72	RAIL RUBBING CONVEX 12FT6IN
30103100	311405	952025001500	72	END TREATMENT BREAKAWAY-CABLE-TERMINAL
30101503	311406	952025002000	72	ASSEMBLY SUPPORT 6INX5INX3/16IN
30101700	311407	952030000100	72	BARRIER BOX-BEAM 18FT 3WM/WMC
30101700	311408	952030000200	72	BARRIER BOX-BEAM 36FT 3WM/WMC
30101503	311410	952030000560	72	ASSEMBLY EXTERNAL SPLICE 2FT
31162500	311412	952060000100	72	BRACKET USED ANCHOR-ROTATING-ASSY
30103100	311413	952060000110	72	RAIL CHANNEL RUBING USED 2S 10GA 6INX3IN
30103100	311414	952060000190	72	RAIL EL USD WBEAM 5-HO 12G 2A/B/C/S/M/WM
30103100	311415	952060000200	72	RAIL EL USD WBEAM 2-HO 12G 2A/B/C/S/W/WM
30103100	311416	952060000210	72	RAIL EL USD WBEAM 3-HO 12G 2A/B/C/S/W/WM
30103100	311417	952060000220	72	RAIL EL USD WBEAM 5-HO 12G 2A/B/C/S/W/WM
30103100	311418	952060000240	72	RAIL EL USD END DRIVEWY&OPEN 2W
30103100	311419	952060000300	72	RAIL USED RAIL CONVEX TYPE 2B
30103100	311420	952060000400	72	TERMINAL BRIDGE USED
30103100	311421	952060000600	72	TERMINAL DOUBLE USED TYPE2A/B/S
30103100	311422	952060000700	72	TERMINAL FACE USED
30103100	311423	952060000710	72	TERMINAL SINGLE-OUTSIDE USED TYPE2-A/B/S
30103100	311424	952060000720	72	TERMINAL SINGLE-INSIDE USED TYPE2-A/B/S
30103100	311425	952060000730	72	TERMINAL BCT USED TYPE2-S
30103100	311426	952060000800	72	TERMINAL USED TYPE2W/WC
30103100	311427	952060000910	72	RAIL USED CONCAVE 2B
30103100	311428	952060000930	72	RAIL USED 12'6" 6 X 8.2 2S
30103100	311429	952060000940	72	RAIL USED 12' 16" 6 X 8.2 2SC
30103100	311430	952060000950	72	RAIL USED 12' 6" CONVEX
30103100	311431	952060000980	72	RAIL USED 13' 6" CONCAVE
30101700	311432	952065000060	72	BARRIER BOX-BEAM USED 18FT 3WM/WMC
30101700	311433	952065000070	72	BARRIER BOX-BEAM USED 24FT 3WM/WMC
30101700	311434	952065000120	72	BARRIER NEW-JERSEY USED 12FTSEC
30103100	311435	952065000400	72	RAIL PAIR BOX-BEAM SPLICE USED
30101503	311436	952065000500	72	ASSEMBLY END-TREAT USED W/24-BOX-BEAM

Example

Reporting Winter Material Mix Codes

An equipment operator is spreading a mixture of 50% salt and 50+% Type II anti-skid (activity 711-7521-01). He loads this material at a stocking area 0001 and spreads a total of 6 tons during his shift.

The material will be reported on the payroll as:

Materials

Material Number	Description	Quantity	SLOC	Mix %
242205	Type II Anti-skid	6.0	0001	E

When using a mixture of anti-skid and salt ALWAYS record the ANTI-SKID in "MATERIAL NUMBER "BLOCK.

Refer to the WINTER MATERIAL MIX CHARTS below and on page 4.8 for the six digit material numbers.

WINTER MATERIAL MIX CODES

ANTI-SKID	SODIUM	CODE	ANTI-SKID	SODIUM	CODE
100%	0%	A	80%	20%	J
90%	10%	B	83%	17%	K
75%	25%	C	10%	90%	L
67%	33%	D			
50%	50%	E			
33%	67%	F			
25%	75%	G			
0%	100%	H			

CHAPTER 5: DEFINITIONS

To facilitate a more complete understanding of maintenance management terminology and insure accurate costing of all operations, this chapter defines in detail the applicable cost functions used in support of our Maintenance Management System.

It contains a section on the Performance Standards for Program 711 through 714 (see note) and the quality assurance evaluation reports for maintenance activities.

IMPORTANT NOTES:

Environmental concerns such as wetlands, erosion control, and waterway pollution are to be addressed in the disposal of excavated and waste materials. Waste materials shall not be placed in wetlands or waterways. Waste materials must be properly disposed of or stabilized. Rolling is an acceptable stabilization method. Refer to Publication 23.

If the assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Threatened and Endangered Species Desk Reference (Pub 546) for standard operating procedures for the avoidance of adverse effects to the bog turtle.

MAT (Maintenance Assembly Training) and SIT (Surface Improvement Training) packages are available on the BOMO intranet site. All personnel should review training materials prior to start of work. At a minimum, the Assistant Highway Maintenance Manager in charge of paving or seal coat operations, foreman and core equipment operators (paver, roller, and distributor) shall complete the Surface Improvement Training (SIT) course within 2 years of performing this operation.

Hauling and safety requirements listed in the performance standards have been calculated based on theoretical averages, specific field situations may require changes in stated manpower and equipment. The hauling charts on page 5.3 and the Publication 213 may be used to determine actual hauling and safety requirements.

Non - Operators (NON-OPER) are individuals regardless of classification who are assigned to the crew but are not assigned to operate equipment that requires a certified operator.

PERFORMANCE STANDARDS AND COST FUNCTIONS DEFINITIONS

PROGRAM 711 THRU 714

A performance standard is like an average, not always exact but a good working figure which is reasonable, fair, and can serve as a readily available benchmark for the activity and method to which it applies. It represents a reasonable expectancy of productive output by a crew of specified men and equipment. The performance standard is in terms of man hours per production unit.

COMPOSITION OF A PERFORMANCE STANDARD

ACTIVITIES

Preparation time at the yard, tool box, or assembly point before going to the work site. This includes servicing of equipment, loading tools, required materials, signs, flags, etc. Also included are the daily safety talk and other instructions.

Travel to and from job sites.

Preparation time at the work site is in the standard. This includes such items as getting tools ready, preparing and setting up equipment, unloading material. It also includes putting away tools and cleaning up area before leaving the work site.

Hauling materials.

All the work effort required to perform the job.

Safety requirements.

Clean up time at the county yard, tool box, or assembly point.

Supervision time (usually the foreman) is in the standard. This includes time working with his crew, paper work, obtaining materials, giving job instruction, checking work schedules, discussions with property owners, etc.

Interruptions of short duration are in the standard. Examples would be giving directions to motorists, discussions with assistant manager, etc.

Unavoidable delays such as equipment breakdown if the delay is less than one-half hour. If the delay exceeds 30 minutes the crew should be assigned another activity.

HAULING REQUIREMENTS

These charts can be used to determine the number of trucks required for a continual hauling operation. The examples on the following page show how these charts are to be used.

TRUCK TRAVEL TIME (MINUTES)
AVERAGE TRAVEL SPEED
(MPH)

MILES TRAVELED	25	35	45	55
5	12	9	7	5
10	24	17	13	11
15	36	26	20	16
20	48	34	27	22
25	60	43	33	27
30	72	51	40	33
35	84	60	47	38
40	96	69	53	44
45	108	77	60	49
50	120	88	67	55
55	132	94	73	60
60	144	103	80	65

NUMBER OF TRUCKS REQUIRED ON A HAULING ACTIVITY

TOTAL TONS REQUIRED PER DAY	10	20	30	40	50	60	70	80	90	100	110	120
50	1	1	1	1	1	2	2	2	2	2	3	3
100	1	1	2	2	2	3	3	4	4	5	5	5
150	1	2	2	3	4	4	5	5	6	7	7	8
200	1	2	3	4	5	6	6	7	8	9	10	11
250	2	2	4	5	6	7	8	9	10	11	12	13
300	2	3	4	6	7	8	9	11	12	13	14	16
350	2	3	5	6	8	9	11	12	14	15	17	18
400	2	4	6	7	9	11	12	14	16	17	19	21
450	2	4	6	8	10	12	14	16	18	20	22	23
500	3	5	7	9	11	13	15	17	20	22	24	26
550	3	5	7	10	12	14	17	19	22	24	26	29
600	3	6	8	11	13	16	18	21	23	26	29	31
650	3	6	8	11	14	17	20	23	25	28	31	34
700	3	6	9	12	15	18	21	24	27	30	33	36

Total round trip haul time (minutes)
(Includes load/unload time and predictable delays)

TOTAL TONS REQUIRED PER DAY	10	20	30	40	50	60	70	80	90	100	110	120
50	1	1	1	1	1	1	1	1	1	1	2	2
100	1	1	1	1	1	2	2	2	2	2	3	3
150	1	1	1	2	2	2	3	3	3	3	4	4
200	1	1	2	2	2	3	3	4	4	5	5	5
250	1	1	2	2	3	3	4	4	5	5	6	7
300	1	2	2	3	3	4	5	5	6	7	7	8
350	1	2	3	3	4	5	5	6	7	8	8	9
400	1	2	3	4	4	5	6	7	8	9	9	10
450	1	2	3	4	5	6	7	8	9	10	11	11
500	2	2	3	4	5	7	7	9	10	11	12	13
550	2	3	4	5	6	7	8	9	11	12	13	14
600	2	3	4	5	7	8	9	10	11	13	14	15
650	2	3	4	6	7	8	10	11	12	14	15	16
700	2	3	5	6	8	9	10	12	13	15	16	18

Total round trip haul time (minutes)
(Includes load/unload time and predictable delays)

The County Manager or members of his staff must estimate the total round trip haul time which is shown across the top of the charts. This figure includes actual travel time, load/unload time, waiting to load/unload and/or other predictable delays. An example of a predictable delay would be waiting at an asphalt plant or quarry due to the vendor providing material to other customers. Two examples on how to use the hauling charts will now be given.

EXAMPLE 1

QUESTION **Plant mix surface treatment operation requiring 350 tons of material per day is planned. How many 33,000 GVW trucks are needed to meet these daily production requirements?**

SOLUTION

STEP 1 Estimate the actual round trip travel time from source to job site. After estimating the distance and average travel speed refer to the chart titled Truck Travel Time to determine the round trip travel time. In this example, we had a 30 mile round trip distance with an average truck speed of 45 MPH giving a round trip travel time of 40 minutes.

STEP 2 The load/unload time at the source and job site must now be determined. In this situation it is estimated to be 20 minutes.

STEP 3 Any waiting time at the source or job site must be estimated. In this example the assistant knows the batch plant has no large customers to provide for so he estimates a 5 minute wait at the plant and adds to this a 5 minute delay at the paver for a total 10 minute wait time.

STEP 4 Adding the total minutes in Steps 1, 2 and 3 will give the total round trip haul time. In this example 40 minutes + 20 minutes, + 10 minutes equals a 70 minute round trip haul time.

STEP 5 Knowing you have a 70 minute total round trip haul time and require 350 tons of material per day, how many 33,000 GVW trucks are required? Using the chart for 33,000 GVW trucks proceed across the top row until you reach 70 minutes and go down that column until the row which corresponds to 350 tons per day is reached. The number in the intersected box is the total trucks required to haul material. In this situation it requires eleven 33,000 GVW trucks to deliver 350 tons of material with a round trip haul and delay time of 70 minutes.

EXAMPLE 2

QUESTION **The County Maintenance Manager in the above example only had eight 33,000 GVW trucks and needed eleven, therefore, he decided to use the 3 tandem trucks (56,000 GVW) in his county on the project. How many 33,000 GVW trucks does he need to supplement the tandems to achieve a daily production of 350 Tons?**

SOLUTION

STEP 1 He has already estimated the round trip haul time to be 70 minutes. Using the chart on the right (for 56,000 GVW trucks), he proceeds across the top row to 70 minutes and down that column until the lowest box containing the figure 3 is reached. Next proceed across that row to the tonnage in that column. The figure here gives the tons that can be delivered by a certain number of trucks at a given round trip haul time. In this case, 3 tandem trucks with a 70 minute haul time can deliver a maximum of 200 tons per day.

STEP 2 Since 350 tons is required and 200 tons will be delivered by the 3 tandems, that leaves 150 tons to be delivered by the 33,000 GVW trucks.

STEP 3 Using the chart on the left (for 33,000 GVW trucks), proceed across the top row until 70 minutes is reached and down the column until the row reading 150 tons per day is achieved. The number in the intersected box is the number of trucks needed. In this situation, five 33,000 GVW trucks are required along with three 56,000 GVW trucks to supply 350 tons of material with a 70 minute round trip haul time.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD PROGRAMS 711 – 714	ASSEMBLY NUMBER 711-7112-01 EFFECTIVE DATE July 1, 2014
ASSEMBLY Roads - Unpaved Shaping Mechanized		PERFORMANCE STANDARD .07 Miles/Man Hour

Assembly Description Summary
This assembly includes all actions relating to shaping operations, such as scarifying, grading, shaping, and compacting on long sections of unpaved roads to restore cross section, or eliminate corrugations and potholes.

The Work Zone Traffic Control set up shall be erected in accordance with Pub #213.

This assembly is typically a short term, slow moving operation.

Environmental concerns such as wetlands, erosion control, and water way pollution are to be addressed in the performance of this operation and in the disposal of waste materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuykill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

Refer to Maintenance Manual, Pub #23, Chapter 6, Unpaved Surfaces.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	
2	Equipment operator	1	Grader		
1	Crew Member	1	Roller		
1	Equip. Oper. (Haul)	1	Rake		
2	Crew Member (safety)	1	Dump Truck		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Mile Code 8	.600 Miles/Hr.	4.0 Miles/Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' activities.

It is important to maintain proper roadway cross-section and adequate ditch line for proper drainage. The grader blade should be set to pull suitable material from the ditch line, toward the center of the roadway. This material can be used to reshape the entire roadway to proper width and cross section. High spots and ruts can be leveled during this process.

Grader should make first pass along ditch line, bringing suitable material toward the center of the roadway. Grader should cut entire width of roadway in areas of ruts and potholes. Distribute loose material over the width of the roadway, maintain desired crown of 3 to 4 inches.

Pull string tooth rake with crew cab, working from center of road toward shoulder, oversize stones and lumps of sod are worked to side of roadway.

Crew members with hay fork remove stones and sod from roadway.

The entire width of roadway disturbed by grading shall be compacted with a roller prior to completion of the day’s activities.

Clean ditch or drainage channel with excavator taking care to cut ditch/channel to original contour by removing only debris or deposited material. Temporary erosion control measures are required if the disturbed area is within 50 feet of a stream. Charge activity 711-7312 for all time spent cleaning ditches/channels.

Erosion controls such as straw bales, silt fence or rock filters are required at the point of discharge until the ditch line revegetates and the area becomes stabilized. Rock filters may be installed as a more permanent control measure at outlet ditches.

The excavation of embankment slopes in conjunction with ditch cleaning will require that a minimum the vertical face of the embankment be seeded and mulched in accordance with Activity 714-7716.

Excavated material is to be properly disposed in a non-wetland area and is not to be broadcast onto the slopes of ditches or drainage channels.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7113-01
		EFFECTIVE DATE July 1, 2014
ASSEMBLY Roads - Unpaved Re-Stabilization Mechanized		PERFORMANCE STANDARD 111.00 Sq. Yds./Man Hour

Assembly Description Summary

This assembly includes all actions relating to the application of stabilization material to long sections of unpaved roads, such as adding, shaping and compacting stabilizing material. This work should be performed during high moisture months of March - April and October - November. If dry, moisture must be added by tank truck.

The Work Zone Traffic Control set up shall be erected in accordance with Publication #213. This activity is typically a short-term, slow moving operation.

Environmental concerns such as wetlands, erosion control, water way pollution are to be addressed in the disposal of excavated materials. Refer to Maintenance Manual Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

Refer to Maintenance Manual, Pub #23, Chapter 6, Unpaved Surfaces.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	
2-3	Equipment Operators	1-2	Grader(s)	Required	Graded
2	Crew Members	4	Dump Trucks		Aggregate
4	Equipment Oper. (Haul)	1	Roller		Run of Bank
2	Crew Members (safety)	1	Rake		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sq. Yd. Code A	1500 Sq. Yd./Hr.	10,000 Sq. Yd./Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

Unless unusual conditions develop, a good stabilization operation should be serviceable for five years before another application is required. Therefore, the re-stabilization effort should be of the highest quality.

A general loss of surface material or a change in riding quality indicates a need for re-stabilization operations. Approximately 2 to 3 inches of new material should be sufficient to correct any faults. Fine material may be graded up from the ditch and blended with the added material to improve compaction. Rake to remove oversize stones or debris before rolling.

If required, remove oversize stones, debris, etc. using a stone rake. Make as many passes as necessary and load collected material into trucks for disposal.

The entire width of roadway disturbed by the re-stabilization operations shall be compacted with a roller prior to completion of the day's activities. Water may be added to dry material to facilitate compaction.

TABLE I Depth of Truck Drop to Obtain 2" or 3" Overall Depth

Roadway Width	2" Compacted Depth	3" Compacted Depth
12'	4"	6"
14'	4 ¾"	7"
16'	5 ½"	8"
18'	6"	9"

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7114-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Unpaved Dust Palliative Bituminous/Calcium Chloride or other Mechanized	1000 Sq. Yds./Man Hr.

Assembly Description Summary

This assembly includes all actions related to the placing of bituminous or calcium chloride materials on unpaved roads to prevent dust formation. The preparation of the road, prior to the application of material, should be charged to Cost Function 7112 Shaping - Unpaved Roads or 7113 Restabilization Unpaved Roads. The roads must be graded and rolled to a reasonable cross section, all loose rocks and clumps of sod removed before material application.

This is a programmed assembly and should be scheduled for spring(April 15th through June 15th)

The Work Zone Traffic Control set up shall be erected in accordance with Publication #213. This activity is typically a short-term, slow moving operation.

Refer to Maintenance Manual, Pub #23, Chapter6, Unpaved Surfaces.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
			BITUMINOUS		
1	Foreman	1	Crew Cab	As Required	MC-30 or MC-70
2	Equipment Opers.	1	Distributor		
1	Crew Member	1	Truck Spreader		
			CALCIUM DRY APPL.		
1	Foreman	1	Truck Spreader	As Required	Dry or Liquid
2	Equip. Opers.	1	Loader		Calcium Chloride
1	Crew Member	1	Crew Cab		
			CALCIUM LIQUID		Other Dust
1	Foreman	1	Distributor(chem)	As Required	Palliatives
1	Equip. Opers.	1	Crew Cab		
1	Crew				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Square Yard Code A	4,300 Sq. Yd./Hr.	30,000 Sq. Yd./Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' activities.

For Bituminous Application

Foreman places “Fresh Oil” warning signs at both ends of work area. The oil tanker should be at or near the work area so the distributor operator can fill his machine with little or no travel. The operator also sets the spray bar to the width directed by foreman.

The bituminous material is applied by the distributor at the prescribed rate (usually 0.25 to 0.30 gallons) per square yard and at correct width.

One application of bituminous material per year applied between 0.25 and 0.30 gallons per square yard should suffice.

The distributor is followed by a truck equipped with a spreader. A thin layer of aggregate or other material is applied only at mailbox approaches, driveways and about 100 feet each side of an intersection with hard surface roads.

A day’s work equals approximately two tanker loads of bituminous material and should be ordered accordingly for delivery at or near work area, both tanker and distributor should be empty at the end of the day, although a distributor can be used to carry over a surplus for next day’s work.

Leave “Fresh Oil” warning signs on site until next day.

For Calcium Chloride Application

Site preparation; set tailgate spreader to required width, (dry application). Set distributor to required width (liquid application).

Apply dry calcium chloride with a tailgate spreader. When dry calcium chloride is used, the first application should be 1.2 lbs. /sq. yd. The second application should be 0.8 lbs. /sq. yd. If more moisture is needed in the road surface, a tank truck should be used to apply water at the rate of 0.5 gal. /sq. yd. to application of dry calcium chloride. Liquid calcium chloride is applied with an approved calibrated pressure distributor capable of mixing the solution to prevent separation. Material is applied at a rate of 0.30 gal./sq. yd. for first application and 0.20 gal./sq. yd. for the second application.

For Other Dust Palliatives

Refer to Manufacture’s Specifications for proper application rates and techniques.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7114-02
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Unpaved Dust Palliative Manual	1000 Sq. Yds./Man Hour

Assembly Description Summary
This assembly includes all actions related to repairing potholes, isolated depressions, etc. on unpaved roads. Extensive repairs should be scheduled and reported as shaping and/or restabilization.

The Work Zone Traffic Control set up shall be erected in accordance with Publication #213.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
Varies	According to job requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Square Yard Code A	None Established	None Established

Method and Procedure:
See Assembly 711-7114-01

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7115-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Unpaved Patching/Base Repair Manual/Mechanized	1000 Sq. Yds./Man Hour

Assembly Description Summary
This assembly includes all actions related to repairing potholes, isolated depressions, etc. on unpaved roads. Extensive repairs should be scheduled and reported as shaping and/or restabilization.

The Work Zone Traffic Control set up shall be erected in accordance with Publication #213.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
Varies	According to job requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Square Yard Code A	None Established	None Established

Method and Procedure:
Varies According to Job Requirements.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7121-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Manual Patching Standard	.11 Ton/Man Hour

Assembly Description Summary

This assembly is all actions related to the standard manual repair of potholes, patching deterioration, and raveling in limited areas. This includes all actions related to manual patching operations. This includes cutting, cleaning, applying TACK and manually placing plant mix or cold bituminous patching material and compaction on paved roads. Bituminous patching on concrete roads is also included in this assembly.

Pavement saws and pavement breakers with compressors are acceptable methods of cutting the pavement.

Cold bituminous patching material does not require TACK unless placed on concrete surfaces.

Before repair work begins, carefully evaluate all surface deficiencies to determine the cause of the failure. Eliminating the cause of the failures (poor drainage, base repair) is the only way to make a permanent repair, refer to Publication 23.

If available, use a bituminous re-heater (Hot Box) or equivalent when the ambient temperature is less than 50˚F.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Bituminous
2	Equipment Operators	1	Compressor with Breaker		Material
2	Crew Members		or Pavement Saw		
2	Crew Members	1	Roller (min.4-6 Ton)		
	(Safety)	1-2	Haul truck(s)	As Required	TACK
		1	Bituminous Reheater		
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	.5 Ton/Hour	4 Tons/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The Foreman marks out the perimeter of the area to be patched with white paint, keel, or chalk line. Marking should be of a rectangular shape with a minimum of angular corners. This will aid in compaction and the quality of the patch and shall not delay the day's operation.

Cutting: Crew member cuts out the marked area, all cuts are to be made from the inside out. This will make cutting easier and minimize disturbance to the area outside of the cut. All outside edges are to be sharp and vertical, with minimal angular corners.

Cleaning: Remove all loose material and dry the area by means of compressed/forced air or broom.

TACK: Apply approved TACK to the vertical edges and all remaining bituminous surfaces, making sure uniform film and 100% coverage is attained. Do not allow TACK to puddle.

Filling: Material should be placed into the hole to proper depth, distributed and finished with lute and corners properly filled. Place material in uniform lifts and compact, allowing material to sufficiently cool before applying the next lift. Do not exceed the maximum lift size or maximum overall thickness for the material being placed; wearing course material must not exceed 3 inches in total depth. A good rule of thumb is 1 1/4 inch un-compacted = 1 inch compacted. For deeper holes, it is recommended to use a binder course, as this material tends to be more stable under loading.

Compaction: Remove all loose material from adjacent surfaces, which may cause bridging. Thoroughly compact each lift with a vibratory roller or a 4-6 ton static roller. On large patches, pinch edges first.

Clean Up: Properly clean up the area, leaving no debris or litter.

Edge Repair: It is recommended to cut a minimum 1 inch deep longitudinal notch, parallel to the centerline, so that the finish grade of the patch is flush with the adjacent pavement. The edge patch shall match the grade and cross-slope of the adjacent pavement to ensure proper water runoff. It is most important to have the shoulder edge tightly compacted against the patch to provide both lateral supports as well as ensuring proper water runoff. In no case should the shoulder be higher than the patch.

Depressions: Establish the limits of the depression by stretching a string line over the area. Mark the perimeter for a paving notch (minimum of 1 inch deep) around the full perimeter of the depression. Cut the paving notch and proceed with the process above (Cleaning, TACK, Filling, Compaction and Clean Up).

Concrete Roadway: Bituminous pothole patching of concrete pavements is considered to be temporary patching. Squaring and cutting of the hole is not required. Potholes should be thoroughly cleaned. Loose and broken concrete should be removed and the holes blown clean and dry. The clean, dry surface should be tacked with an approved tack coat material when placing plant mixed material.

Pie Crust: A Pie Crust Road is defined as a roadway with less than 2 inches total depth of bituminous surface treatment build up. On pie crust roads where the failure covers an extensive area and extends into the base, the repair shall be made and charged under 711-7126-01. Pie crust roads, as designated by the Assistant District Executive for Maintenance, should have surface failures repaired under activity 711-7121-04. Double and triple (layered) treatment, with use of AASHTO #67 and #8 aggregate, is recommended when repairing these types of surface failures.

Follow-up: It is recommended that the repaired areas be covered with a mechanized skin patch or surface treatment within the same calendar year. At a minimum, the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently, then that work is charged to assembly 711-7128-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7121-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Paved Manual Patching Non-Standard	None Established

Assembly Description Summary

This assembly is all actions related to the non-standard manual repair of potholes, patching deterioration, and raveling in limited areas. This includes all actions related to cleaning, placing and compacting.

This method of patching is performed without vertically cutting the edges which results in an inferior patch as compared to 711-7121-01.

Non-standard manual repairs shall only be completed during non-standard, unscheduled work hours, such as call-outs, weekends or holidays. Exceptions for non-standard repairs made during normal scheduled work hours are only permitted with the approval of the District Executive or ADE-Maintenance and meets Publication 23 requirements or during Revision II when pavement conditions are snow or ice covered and the ambient temperature is below 40 degrees.

All other manual patching repairs shall be completed in accordance with Performance Standard 711-7121-01, Manual Patching - Standard.

If available, a mechanical compactor should be used for compaction.

Non-standard patching is to be charged SR and Segment specific. The locations shall be reviewed and permanent repairs shall be scheduled for completion.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab		
As Req.	Equipment Operators	1	Haul Truck	As Required	Bituminous
As Req.	Crew Members	1	Compactor		Material
2	Crew Members (Safety)	1	Bituminous Reheater Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Cleaning: Remove all loose material and dry the area by means of compressed/forced air or broom.

TACK: Apply approved TACK to all remaining bituminous surfaces, making sure uniform film and 100% coverage is attained. Do not allow TACK to puddle. Cold bituminous patching material does not require TACK unless placed on concrete surfaces.

Filling: Material should be placed into the hole to proper depth, distributed and finished with a lute and corners properly filled. Place material in uniform lifts and compact, allowing material to sufficiently cool before applying the next lift. Do not exceed the maximum lift size or maximum overall thickness for the material being placed. A good rule of thumb is 1 1/4 inch un-compacted = 1 inch compacted. For deeper holes it is recommended to use a binder course, this material tends to be more stable under loading.

Compaction: Prior to compaction remove all loose material from adjacent surfaces, which may cause bridging. Thoroughly compact each lift. On large patches, pinch edges first.

Clean Up: Properly clean up the area, leaving no debris or litter.

Follow-up: Monitor the repair and schedule for permanent repairs as per Publication 23. If the roadway is programmed for mechanized patching/leveling with a bituminous overlay within the same construction season the patch material is to be removed by milling or other means of excavation prior to the application of a bituminous overlay.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations
- D-1 Environmental Due Diligence Form

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7121-04
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Paved Spray Patch Manual or Mechanized	None Established

Assembly Description Summary

This assembly is the manual/mechanized repair of potholes using liquid bituminous and aggregate in limited areas. This includes all actions related to surface repairs by spray patching, such as removing weakened material, cleaning, and the application of liquid bituminous and aggregate on paved surfaces, including rigid pavements.

Spray patching includes the manual application, as well as using machines that mix liquid bituminous and aggregate and apply these mixtures through a hose/wand (Roscoe, AMZ, Roadpatcher, etc.).

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to job requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Cleaning: Clean the area, ensuring the removal of all loose material and excess water using air or broom.

Filling: Prime the area with liquid bituminous then place liquid bituminous and aggregate into the area in even layers. Repeat this process until the area is filled. Place a final layer of clean aggregate over the patch to seal it and prevent tracking.

Finish: Properly remove all loose aggregate from around the patched area.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- Cold Water

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7121-05
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Manual Patching Mechanized Cutting	None Established

Assembly Description Summary

This assembly is the manual patching/mechanized cutting repair of potholes in limited areas. This includes all actions related to manual patching operations, milling and cleaning the hole, applying TACK, manually placing plant mix or cold bituminous patching material and compaction on paved roads in limited areas.

The preferred method of cutting is to use a skid-steer with a planer/milling head or equivalent because it is an efficient method of excavation for surface distress repair that ensures a high quality, durable patch while maintaining high productivity levels.

All surface failures must be evaluated carefully before repair work is started. Determining and correcting causes of the failures (poor drainage, base repair) are the only way to make a permanent repair. Refer to Publication 23.

Waste materials must be properly disposed of or stabilized. Rolling is acceptable stabilization.

If available, use a bituminous re-heater (Hot Box) or equivalent when the ambient temperature is less than 50˚F.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Bituminous
2	Equipment Operators	1	Skid Steer with		Material
2	Crew Members		Planer/Milling Head		
2	Crew Members	1	Roller (min. 4-6 Ton)		
	(Safety)	1-2	Haul trucks	As Required	TACK
		1	Bituminous Reheater		
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The Foreman marks out the perimeter of the area to be patched with white paint, keel, or chalk line. Marking should be of a rectangular shape with a minimum of angular corners. This will aid in compaction and the quality of the patch and shall not delay the day's operation.

Milling: Mill out all weakened asphalt both vertically and horizontally. Remove all rounded edges left in place by the radius of the milling head.

Cleaning: Remove all loose materials from the area by means of compressed/forced air or broom.

TACK: Apply approved TACK to the vertical edges and all remaining bituminous surfaces, making sure uniform film and 100% coverage is attained. Do not allow TACK to puddle. TACK is not required when using cold mix material.

Filling: Material should be placed into the hole to proper depth, distributed and finished with lute and corners properly filled. Place material in uniform lifts and compact, allowing material to sufficiently cool before applying the next lift. Do not exceed the maximum lift size or maximum overall thickness for the material being placed; wearing course material must not exceed 3 inches in total depth. A good rule of thumb is 1 1/4 inch un-compacted = 1 inch compacted. For deeper holes it is recommended to use a binder course, as this material tends to be more stable under loading.

Compaction: Remove all loose material from adjacent surfaces, which may cause bridging. Thoroughly compact each lift with a vibratory roller or a 4-6 ton static roller. On large patches, pinch edges first.

Clean Up: Properly clean up the area leaving no debris or litter.

Depressions: Establish the limits of the depression by stretching a string line over the area. Mark the perimeter for a paving notch (minimum of 1 inch deep) around the full perimeter of the depression. Cut the paving notch and proceed with the process above (Cleaning, TACK, Filling, Compaction and Clean Up).

Follow-up: It is recommended that the repaired areas should be covered with a mechanized skin patch or surface treatment within the same calendar year. At a minimum, the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently, then that work is charged to assembly 711-7128-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7122-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Plant Mix Patching-Tow Paver Mechanized	.90 Ton/Man Hour

Assembly Description Summary

This assembly is the placement of mechanized bituminous patches over surface distresses in limited areas. This includes all actions related to mechanized patching operations of areas less than 500 linear feet, such as application of TACK, placing plant mix material with tow paver and compaction of the patched area. A paving notch shall be installed at each end of a full width patch of 1inch or greater in depth.

This work shall be done in accordance with the current Publication 23 and Publication 408, limited to low level roads.

Surface repairs such as potholes and severe depressions shall be patched prior to the mechanized patching and charged accordingly.

Material thicknesses shall comply with Publication 242.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	11	Bituminous
3	Equipment Operators	1	Tow Paver	Tons/Hour	Material
2	Crew Members (Labor)	1	Steel Wheel Roller		
3	Equipment Operators (Haul)	1	Water Truck		
2	Crew Members (Safety)	1	TACK Applicator	As Required	TACK
		1	Skid Steer with		
		1	Planer/Milling Head		
		1	Broom		
		3	Haul trucks		
			Hand tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	11 Tons/Hour	75 Tons/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the crew on the day's assembly.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Milling/Cutting: Notches shall be cut at the limits of the paving and intersecting roadways as per Publication 72M, (Overlay transitions and paving notches). When only one lane is to receive a mechanized patch, a longitudinal (center line) paving notch is required.

Cleaning: The roadway shall be clean of all litter, debris, leaves, loose stone, mud, etc.

TACK: Approved TACK is uniformly applied. TACK shall be allowed to break (cure) before applying the mechanized patch. Refer to Publication 23.

Application: The screed should be heated and tow paver properly adjusted to the correct width and depth before the first loaded truck arrives. When the first truck arrives, check for the proper material type and temperature, if the material is within the proper temperature range, attach the truck to the tow paver. Align the tow paver with the beginning of the area to be patched and start applying the material to roadway. The truck moves forward following the centerline or pavement edge as a guide. Continuous forward movement while raising the bed of the truck will give the best application. Stop only when the truck is empty or at the end of the patch. Depending on the width being patched, one or two crew members follow the tow paver to spot fill and cleanup edges as required.

Compaction: Compact patch with steel wheel roller(s). Rolling shall be completed prior to the mat reaching a temperature of 175˚F. Roller operators drive the water truck and fill their own roller. Density shall be verified by visual non movement method.

Monitor: Before opening the mat up to traffic, check the temperature to assure it is <140˚F.

Markings and Signs: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines and center lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Follow-up: At a minimum the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently then that work is charged to assembly 711-7128-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications

- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7122-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved FB-1 Patching-Mixer Paver Mechanized	2.35 Tons/Man Hour

Assembly Description Summary

This assembly is the placement of mechanized bituminous patches over surface distresses in limited areas. This includes all actions related to mechanized patching operations of areas less than 500 linear feet, such as placing FB-1 material with a mixer paver and compaction of the patched area.

Mix designs shall be completed before work begins and limited to low level roads, refer to Publication 23 and Publication 27.

This work shall be done in accordance with Publication 23 and Publication 408, limited to low level roads.

Surface repairs such as potholes and severe depressions shall be repaired prior to mechanize patching and charged accordingly.

Mixer paver patching is normally placed on bituminous surfaced roadways carrying light to medium traffic, 1500 ADT or less per Publication 23.

A TACK application is not required with FB mixes.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	35 Tons	
5-6	Equipment Operators	1	Mixer/Finish Paver	Per Hour	Aggregate
2	Crew Members	1	Steel Wheel Roller		
3	Equipment Operators (Haul)	1	Water Truck	620 Gal. Per Hour	Liquid Bituminous
2-3	Crew Members (Safety)	1	Skid Steer with Planer/Milling Head		
		1	Broom	As Required	Fine Aggregate
		1	Distributor		
		3	Haul Trucks		
		1	Sand Truck		
		1	Loader		
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	35 Tons/Hour	230 Tons/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Milling/Cutting: Notches shall be cut at the limits of the paving and intersecting roadways as per Publication 72M, (Overlay transitions and paving notches) and shall not delay the day's operation.

Cleaning: The roadway shall be swept clear of all debris before the assembly begins.

Application: The oil is heated in a distributor, as per the manufacturer's recommended application temperature, then transferred into the mixer paver. AASHTO #8 (1B) aggregate is used for FB-1 wearing courses. AASHTO #67 (#2) aggregate is used for FB-1 binder courses. Aggregate is deposited in the hopper of a mixer paver by the haul trucks. Begin mixing aggregate and oil and feed into spreader section. All aggregate must be coated with oil, as per the mix design, before application to roadway. Begin forward motion and apply mix at proper depth and width, usually for a scratch course 60-90 Lbs./Sq. Yd., for a wearing courses >90 - <160 Lbs./Sq. Yd. and 160 - 220 Lbs./Sq. Yd. for a binder courses. The progress of the operation is dependent on a continuous supply of aggregate and oil to the paver.

Compaction: Compaction is accomplished with a break down and finish roller. After initial compaction, apply 3 - 5 Lbs./Sq. Yd. of fine aggregate and finish rolling. One operator operates both the fine aggregate and water truck. Density shall be verified by visual non movement method.

Markings and Signs: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines and center lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Follow-up: It is recommended that the repaired areas be covered with a mechanized skin patch or surface treatment within the same calendar year. At a minimum the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently then that work is charged to assembly 711-7128-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Equipment Specific Verification Forms (Required on Site)

- Pavement Mix Designs-Route Specific (Required on Site)
- Daily Production Report / Yield Test Results (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- Oil-Aggregate Compatibility Test Results (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7122-03
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Plant Mix Patching – Finish Paver Mechanized	1.43 Tons/Man Hour

Assembly Description Summary

This assembly is the placement of mechanized bituminous patches over surface distresses in limited areas. This includes all actions related to mechanized patching operations of areas less than 500 linear feet, such as application of TACK, placing hot plant mix material with a finish paver and compaction of the patched area. Paving notches are to be used at each end of a full width patch of 1 inch or greater in depth. When only one lane is to receive a mechanized patch, a longitudinal (center line) paving notch is required.

This work shall be done in accordance with Publication 23 and Publication 408, programmed on the M-213 and approved by the ADE – Maintenance.

Surface repairs such as potholes and severe depressions shall be repaired prior to mechanize patching and charged accordingly.

Material thicknesses shall comply with Publication 242.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	23 Tons	Bituminous
4	Equipment Operators	1	Paver	Per Hour	Material
4	Crew Members	1	Steel Wheel Roller (min. 10 Ton)		
4	Equipment Operators (Haul)	4	Haul Trucks		
2-3	Crew Members (Safety)	1	Skid Steer with Planer/Milling Head		
		1	Broom	As Required	TACK
		1	Water Truck		
		1	TACK Applicator		
		1	Compressor and Breaker		
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	23 Tons/Hour	160 Tons/Day

Method and Procedure:
Prior to the beginning of work the Foreman shall give the required safety talk and provide general instructions to the crew on the day's assembly.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Milling/Cutting: Notches shall be cut at the limits of the paving and intersecting roadways as per Publication 72M, (Overlay transitions and paving notches) and shall not delay the day's operation.

Sweeping: The roadway shall be swept clear of all debris before the assembly begins.

TACK: Approved TACK is uniformly applied. TACK shall be allowed to break (cure) before applying the mechanized patch, refer to Publication 23.

Application: The screed should be heated, and paver properly adjusted to the correct width and depth before the first loaded truck arrives. When the first truck arrives, check for the proper material type and temperature, if the material is within the proper temperature range, align the equipment with the beginning of the area to be patched and start applying material to the roadway. The paver moves forward following the centerline or pavement edge as a guide. Continuous forward movement while raising the bed of the truck will give the best result. Stop only when the truck is empty or at the end of the patch. Depending on the width being paved, one or two crew members follow the paver to spot fill and cleanup edges as required. Crew members check paving depth, quality and repair surface mat as needed.

Compaction: Compact patch with steel wheel roller(s). Rolling shall be completed prior to the mat reaching a temperature of 175˚F. Roller operators drive the water truck and fill their own roller. Density shall be verified by visual non movement method.

Monitor: Before opening mat up to traffic check temperature to assure it is <140˚F.

Markings and Signs: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines and center lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Follow-up: At a minimum the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently then that work is charged to assembly 711-7128-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications

- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7122-04
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Plant Mix Edge Patching – Tow Paver/Drag Box Mechanized	.90 Ton/Man Hour

Assembly Description Summary

This assembly is the placement of a mechanized bituminous edge patch. This includes all actions related to mechanized edge patching to repair extensive deterioration and re-establishment of roadway width over existing base, including cleaning, application of TACK, placement of hot plant bituminous mix, and compacting.

Any drainage repairs, such as shoulder cutting, ditching, etc. shall be completed in advance of the operation.

This work shall be done in accordance with Publication 23 and Publication 408, limited to low level roads.

The cross-section and profile of the repair area(s) shall match that of the existing roadway. The re-established pavement width shall be equal to the roadway width as recorded in the Roadway Management System (RMS) or the width of the base material as indicated by field conditions.

The depth of the mechanized edge shall match the depth of the existing pavement edge.

It is recommended to cut a longitudinal notch, minimum 1 inch in depth, parallel to the centerline, so that the finish grade of the patch is flush with the adjacent pavement. The edge patch must match the grade and cross-slope of the adjacent pavement to insure water runoff.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	11 Tons/Hour	Bituminous
2	Equipment Operators	1	Tow Paver/Drag Box		Material
3	Crew Members	1	Roller (min. 4-6 Ton)		
3	Equipment Operators (Haul)	1	Water Truck		
2-3	Crew Members (Safety)	1	Tack Coat Applicator		
		1	Broom		
		3	Haul Trucks	As Required	TACK
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	11 Tons/Hour	75 Tons/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the crew on the day's assembly.

Marking: Roadway shall be marked for limits and location of all scheduled repairs. This should be done in advance of operation and shall not delay the day's operation.

Sweeping: The roadway shall be swept clear of all debris before the assembly begins.

TACK: Approved TACK is uniformly applied. TACK shall be allowed to break (cure) before applying the Mech. patch. Refer to Publication 23.

Application: Have the screed heated and paver properly adjusted to the correct width and depth before the first loaded truck arrives. When the first loaded truck arrives check the material for proper type and temperature. If it is within the proper temperature range, attach it to the paver. Align the paver with the beginning of the area to be patched and start applying the material to roadway. The truck moves forward following the centerline or pavement edge as a guide. Continuous forward movement while raising the bed of the truck will give the best application. Stop only when the truck is empty or at the end of the patch. Depending on the width being patched, one or two crew members follow the paver to spot fill and cleanup edges when required.

Compaction: Compact patch with steel wheel roller(s). Rolling shall be completed prior to the mat reaching a temperature of 175˚F. Roller operators drive the water truck and fill their own roller. Density shall be verified by visual non movement method.

Monitor: Monitor WZTC and operations interaction with the motoring public. Before opening mat up to traffic check temperature to assure it is <140 ˚F.

Markings and Signs: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines and center lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Follow-up: The edge patch should have a surface treatment applied prior to winter. When performed outside seasonal limitations, prior approval is required by District Executive. If a longitudinal joint is milled, sealing of the joint is required prior to winter; this is incidental to this assembly.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7122-05
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Paved Plant Mix Patching – Partial Depth (Milling Machine and Widener) Mechanized	3.33 Tons/Man Hour

Assembly Description Summary

This assembly is the placement of mechanized bituminous patches over surface distresses in limited areas. This includes all actions related to partial depth removal of bituminous material, in a high-productivity surface repair operation utilizing a milling machine and a mechanized widener/tow paver.

The depth of the repair shall not extend beyond the depth of the wearing course.

The cross-section and profile of the repair area(s) shall match that of the existing roadway. Re-establishment of the pavement edge shall be equal to the roadway width as recorded in the straight-line-diagram (SLD) or to the width of the base material as indicated by field conditions.

Consideration should be given to stockpiling milled material for future approved use.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project) and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab	As Required	Bituminous
3-4	Equipment Operators	8-10	Haul Truck		Material
4-5	Crew Members	1	Milling Machine		
8-10	Equipment Operators (Haul)	1	Widener/Tow Paver		
2-3	Crew Members (Safety)	1	Roller (min. 4-6 Ton)	As Required	TACK
		1	Broom		
		1	TACK Applicator		
		1	Water Truck		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	11 Tons/Hour	350 Tons/Day

Method and Procedure:

Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Marking: Limits of each patch are to be marked on the roadway in advance of the operation and shall not delay the day's operation.

Milling: Mark all potential hazards prior to starting the milling operations. Mill out the deteriorated areas. All repair areas must extend into sound pavement, both vertically and horizontally. Square off all rounded edges left by the milling machine prior to cleaning and applying TACK.

Cleaning: Cleaning of the milled horizontal surfaces is required. All loose material must be removed with particular attention given to the inside edges and corners of the milled areas.

TACK: Apply an approved TACK material to all existing asphalt surfaces that will come into contact with fresh asphalt. TACK coverage must be complete and uniform, do not allow material to pond. Allow time for the TACK to cure.

Filling: As the trucks arrive, check for the proper material type and temperature. Set the widener strike off plate to the proper height and profile to insure that the repair area matches the roadway grade and profile. A good rule of thumb is 1 ¼ inch un-compacted = 1 inch compacted. Adjust as necessary and monitor throughout the operation. Material lift thickness depends on the type of material being used and the depth of the repair, refer to Publication 242.

Compaction: Clean all adjacent surfaces prior to compacting. Compaction is completed by a smooth drum vibratory roller properly sized for the width and depth of the patch (min. 4-6 tons). Pinch roll the edge, then roll the remainder of the patch. Care should always be given to insure the roller drums do not bridge the patch area. Allow time for the material to cool before allowing traffic to run on the repaired areas. Clean up all loose debris and litter from the work area.

Markings and Signs: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines and center lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Follow-up: It is recommended that the repaired areas be covered with a mechanized skin patch or surface treatment within the same calendar year. At a minimum the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently then that work is charged to assembly 711-7128-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7123-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved FB-1 Mechanized Mixer Paver- 1 inch Paving	59 Gal./Man Hr.

Assembly Description Summary

This assembly includes all actions relating to the placing of a uniform, full width 1 inch depth (90-110 lbs. per square yard) FB application with a mixer paver; such as sweeping, applying mix to road surface and compaction on paved roads.

All surface failures must be studied carefully before repair work is started. Determining and correcting causes of failure is the only way to make permanent repairs.

Weather conditions, temperature and moisture restrict surface treatment operations to the time period between April 1st and October 31st, (Department Specifications Pub 408, Sec 431).

Oil/Aggregate compatibility tests and mix designs shall be completed before work begins.

Refer to Maintenance Manual Chapter 7, Mixer Paver.

FB Mixer Paver applications are restricted to flexible and rigid base roads carrying light to medium traffic of 1500 ADT or less.

Field conditions will determine whether a seal coat is placed during the same or succeeding construction season.

The work zone traffic control set up shall be in accordance with Publication 213. This assembly is typically a short-term, slow moving operation.

This work shall be programmed on the M-213 and approved by the ADE – Maintenance.

A training package has been prepared for this assembly. All personnel should review training materials prior to start of work. At a minimum, the Assistant Manager in charge of paving operations, foreman and core equipment operators (paver, roller, and distributor) shall complete the Surface Improvement Training (SIT) course within 2 years of performing this operation.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	50 Tons	Required
6	Equipment Operators	1	Distributor	Per Hr.	Aggregate
2	Crew Members	1	Mixer Paver		
As Req'd	Equip. Operators	2	Steel Wheel		
	(Haul)		Rollers	1000 Gal.	Liquid
3	Crew Members	1	Front End Loader	Per Hr.	Bituminous
	(Safety)	1	Sand Truck		
		As Req'd	Haul Trucks		
		1	Power Broom	As Required	Sand/Dust
		1	Water Truck		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallons Code 5	1,000 Gals./Hour	7,000 Gals/Day

Method and Procedure:
All surface repairs shall be completed prior to the beginning of this operation, and field verified. These assemblies shall be charged according to the operation preformed.

Project foreman or Assistant Manager should communicate planned type and quantities of material.

The Limits of work shall be marked on the roadway

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instruction to the work crew on the day's assemblies.

Site specific work zone shall be set up according to the current Pub. 213

Notches are not required to be cut.

A tack coat application is not required with FB mixes.

The roadway shall be swept clear of all loose debris and dried mud before the operation begins.

FB-1 Mixer Paver applications are normally placed on bituminous surfaced roadways carrying light to medium traffic; 1500 ADT or less per the Maintenance Manual, Pub. 23, Chapter 7, FB 1&2 Wearing Course.

Oil is heated to mixing temperature before transfer to the mixer paver by the distributor. The proper mixing temperature of the emulsified asphalt are as listed E-4 or E-5 is 100º F to 160º F.

Aggregate is deposited in hopper of mixer paver by hauling trucks. The progress of the operation is dependent on a continuous supply of aggregate/oil to the paver so sufficient trucks must be utilized.

The heated liquid bituminous and proper aggregate are mixed in the mixer paver and applied directly to the roadway at the pre-determined width and depth.

AASHTO number 8 (1B) aggregate is used for FB-1 wearing courses.

Start mixing aggregate and oil then feed into spreader section. All stone must be oil coated before application to roadway. Begin forward motion and apply mix at proper depth and width; usually 90-110 lbs. per square yard for wearing courses.

The project foreman is to document actual field yields of material placed.

Feather the ends of the patch and the edge across intersecting roadways.

Compaction is accomplished with a break down and finish roller. After initial compaction, apply 3-5 lbs./sq. of fine aggregate and finish rolling. One operator operates both the fine aggregate and water truck.

Adjustments to manholes, catch basins and similar structures shall be made to match the new finish grade. Municipalities shall be contacted in advance and adjustments to their facilities coordinated with the paving operations.

The use of temporary pavement markings and signs shall be installed if existing markings were eradicated by the day's operation and should be charged to this cost function. After completion of the required work contact the Assistant Manager to have permanent markings replaced.

References and Essential items for this assembly

References:	**Essential Items :**
Pub 23 Maintenance Manual	First Aid Kit
Pub 445 Safety Policy Manual	Oil-Aggregate Compatibility Test Results
Pub 213 Work Zone Traffic Control	Yield Test Results
Pub 517 Job Safety Analysis	Temperature Gauge(s)
Pub 464 Maintenance Field Reference	Cold Water
Pub 408 Highway Construction Specifications	Emergency Spill Kits
	Equipment Specific Verification Forms
	Pavement Mix Designs-Route Specific
	Daily Production Report

Note: Environmental concerns shall be considered, verify with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7124-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Paved Seal Coat-Single Application Liquid Bituminous Mechanized	105 Gals./Man Hour

Assembly Description Summary

This assembly is the single application of liquid bituminous and aggregate. This includes all actions related to the application of liquid bituminous material, immediately followed by the application and rolling of coarse aggregate.

Sweep the surface to remove loose aggregate before and after opening the roadway to traffic.

All surface defects and roadway preparation work shall be repaired and completed in accordance with Publication 23 prior to this assembly. Roadway preparatory work such as pothole patching, skin patching, crack sealing, base repair, pipe replacement, etc., shall be charged to the appropriate assembly. If bleeding issues arise within the same construction season, the corrective actions shall be charged to this assembly, subsequent years shall be charged to 711-7124-02.

This assembly shall be programmed on the M-213 and approved by the ADE-Maintenance.

This standard is based on the bituminous tanker being located within 2 miles of the work job site, preferably near midpoint of the day's work area, and the aggregate stockpiled close by. This distance determines number of trucks required for hauling. If the aggregate is hauled directly from the quarry, it may influence the number of trucks required.

At a minimum, the Assistant Manager in charge of seal coat operations, Foreman, and core equipment operators (distributor, chipper, and roller) shall have completed the Surface Improvement Training (SIT) course within the past 2 years.

The Work Zone Traffic Control set up shall be placed in accordance with the current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1-2	Foremen	1-2	Crew Cabs		
6	Equipment Operators	2	Distributors	2200 Gals	Liquid
1-2	Crew Members	1	Chip Spreader	Per Hr.	Bituminous
5-6	Equipment Operators (Haul)	1-2	Brooms		
3	Crew Members	2	Pneumatic Tire Rollers	As	Aggregate
	(Safety)	1	Loader	Required	#8 - 1% LBW
		5-6	Haul Trucks		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	2,200 Gals./Hour	15,000 Gals./Day

Method and Procedure:
Prior to the beginning of the work, the Foreman shall give the required safety talk and provide general instruction to the crew on the day's activities, including targeted application rates. The entire roadway shall be swept clear of all debris before the operation begins. Preparatory work, such as potholes and severe depressions, shall be repaired prior to assembly and charged accordingly.

Equipment Verification: Distributors, Chip Spreader and Pneumatic Tire Rollers shall be verified as outlined in Publication 23. Additionally, design application rates for liquid bituminous and aggregates shall be developed by the county, and approved by the District Materials Manager or designee, as outlined in Publication 27 (Bulletin 27) or equivalent before work begins. Copies of these documents shall be on site and available for review.

Distributors: The operator transfers a load of liquid bituminous material from the tanker, verifying the material type and temperature of each load. The operator then moves to the starting point for the day's work, setting the spray bar to the correct height and width to include "End Nozzles" for the centerline. The distributor operator verifies that there is a uniform spray pattern and application rates for liquid bituminous material. The application rate shall be within +/-10% of the design rate or field adjusted rate and documented by the Foreman on the payroll.

Chip Spreader: The operator moves the chipper into position setting the application rate and width to cover the liquid bituminous area with aggregate. The operator and one or two crew members operate the chip spreader and verify the application rate for the aggregate. The application rate for the aggregate shall be within +/- 20% of the design rate or field adjusted rate and documented by the Foreman on the payroll. A minimum of two Aggregate Yield Tests shall be performed each day, documenting date and location of the test, and be available for review on site.

Haul Trucks: A loaded truck is positioned and hooked to the chip spreader; care must be exercised to not spill excess aggregate onto the roadway. Cycling trucks in and out of the chip spreader will ensure an efficient operation.

Rollers: Immediately follow with a sufficient number of Pneumatic Tire Rollers to seat the aggregate in one pass. The Pneumatic Tire Roller ground contact pressure shall be within 40 to 50 PSI.

Sweeping: Once the operation is completed on a roadway section and before the crew makes the return pass, sweep the untreated section of roadway to the treated section of the roadway. Sweeping shall not delay the operation and shall not dislodge the aggregate from the existing treated roadway. By days end, hills, curves and intersections shall be swept of excess aggregate, with an emphasis on sweeping the entire roadway by day's end. The entire roadway shall be swept clear of excess aggregate within 24 hours, or sooner, of the operation and shall be verified. The sweeping of the roadway, the day of and any day after, is incidental to the operation and shall be charged to this assembly.

Mat Protection: Control of traffic through the work area is most important to achieve a high quality project. Keeping traffic off the fresh mat, until an adequate cure has occurred, is important. A pilot vehicle should be used to control both traffic and speed on the recently completed mat (lane) and throughout the project.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements must be in place and maintained in accordance with Publication 213. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 27 Bulletin 27 Specifications-Special Bituminous Mixtures
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- Project Specific Mix Design (Required On Site)
- Oil – Aggregate Compatibility Test Results (Required on Site)
- Equipment Verification Forms M-214A through M-214F and Project Specific Designs (Required on Site)
- Yield Testing Equipment and Results to include Daily Production Reports (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7124-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Surface Treatment Sanding-Bleeding Roads Mechanized	None Established

Assembly Description Summary

This assembly includes all actions related to placing sand and/or appropriate aggregates on roads that are flushing or bleeding due to liquid bituminous operations.

Production is **always** reported as Zero (0) gallons.

This assembly is only to be used for bleeding as a result of work done in prior construction seasons. If bleeding issues arise on a project that was completed within the current construction season, all activities shall be charged to 711-7124-01.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies according to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	None Established	None Established

Method and Procedure:

Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

This varies according to field conditions.

It is very difficult to correct the flushed condition of a seal coat, surface treatment or shoulder overspray. Several measures can be attempted to improve the existing flushed condition. Since the flushing can range from marginal (just a smear on the aggregate) to truly excessive (significant amount of bitumen which can be scraped off the aggregate of the old surface), these measures should be attempted on a trial basis only after an engineering judgment of the situation has been made. The following remedial measures are listed in the order of increasing potential for success, as per Publication 23.

Options:

1. Apply clean, dry coarse sand (for marginal flushing) or dry # 8 aggregate (for excessive flushing) on a hot day and roll immediately.
2. Apply heated coarse sand or heated # 8 aggregate on a hot day and roll immediately.
3. Apply pre-coated # 8 aggregate at ambient temperature on a hot day and roll immediately. Pre-coating with PG 64-22 is preferred.
4. Apply heated pre-coated # 8 aggregate (preferably using PG 64-22) on a hot day and roll immediately. The temperature range for aggregate pre-coated with PG 64-22 should be in the 300˚ F - 350˚ F range.

   NOTE: The chances of success in aggregate retention will be enhanced if a clean 1/4 inch size aggregate is used in lieu of # 8 aggregate in remedial measures. Reference Publication 23.

   It should also be noted that treatments 1 through 4 will have a better chance of success if the work is done in hot weather as soon as bleeding is observed. To further increase the chance of success, a steel wheel roller, in static mode, should be used to seat the aggregate. A minimum of 3 passes will give optimum results.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7124-03
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Paved Surface Treatment Slurry Seal/Ralumac/Nova Chip	None Established

Assembly Description Summary

This assembly includes all actions related to the contract application of Slurry Seal, Ralumac or Nova Chip material.

Refer to Publication 23.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Mile	None Established	None Established

Method and Procedure:

To be completed per contract.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7124-04
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Surface Treatment Liquid Bituminous - Seal Coat-Double Application Mechanized	None Established

Assembly Description Summary

This assembly is the double application of liquid bituminous and aggregate. This includes all actions related to the application of liquid bituminous material, immediately followed by the application and rolling of coarse aggregates. This is followed by a second application of liquid bituminous material, immediately followed by the application and rolling of an additional layer of coarse aggregates.

Sweep the surface to remove loose aggregate before and after opening the roadway to traffic.

All surface defects and roadway preparation work shall be repaired and completed in accordance with Publication 23 prior to this assembly. Roadway preparatory work such as pothole patching, skin patching, crack sealing, base repair, pipe replacement, etc., shall be charged to the appropriate assembly.

This assembly shall be programmed on the M-213 and approved by the ADE-Maintenance.

The hauling of materials to and from the job site, sweeping, cleaning of equipment after the project, and cleaning of the road prior to and after the seal coat application, are all incidental to the operation and shall be charged to this assembly.

This standard is based on the bituminous tanker being located within 2 miles of the work job site, preferably near midpoint of the day's work area and the aggregate stockpiled close by. This distance determines the number of trucks required for hauling. If the aggregate is hauled directly from the quarry, it may influence the number of trucks required.

At a minimum, the Assistant Manager in charge of seal coat operations, Foreman, and core equipment operators (distributor, chipper, and roller) shall have completed the Surface Improvement Training (SIT) course within the past 2 years.

The Work Zone Traffic Control set up shall be placed in accordance with the current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1-2	Crew Cabs		
6	Equipment Operators	2	Distributors	2200 Gals	Liquid Bit.
1-2	Crew Members	1	Chip Spreader	Per Hr.	Bituminous
5-6	Equipment Operators(Haul)	1-2	Brooms		
3	Crew Members	2	Pneumatic Tire Rollers	As	Aggregate
	(Safety)	1	Steel Wheel Roller	Required	#67- 1% LBW
		1	Loader		#8- 1% LBW
		5-6	Haul Trucks		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	None Established	None Established

Method and Procedure:
Prior to the beginning of the work, the Foreman shall give the required safety talk and provide general instruction to the crew on the day's activities, including targeted application rates. The roadway shall be swept clear of all loose debris before the operation begins. Preparatory work such as potholes and severe depressions shall be repaired prior to this assembly and charged accordingly.

First Application #67 Aggregate

Equipment Verification: Distributors, Chip Spreader and Pneumatic Tire Rollers shall be verified as outlined in Publication 23. Additionally, design application rates for liquid bituminous and aggregates shall be developed by the county and approved by the District Materials Manager or designee, as outlined in Publication 27 (Bulletin 27) or equivalent before work begins. Copies of these documents shall be on site and available for review.

Distributors: The operator transfers a load of liquid bituminous material from the tanker, verifying the material type and temperature of each load. The operator then moves to the starting point for the day's work, setting the spray bar to the correct height and width to include "End Nozzles" for centerline. The distributor operator verifies that there is a uniform spray pattern and application rates for liquid bituminous material. The application rate shall be +/-10% of the design rate or field adjusted rate and documented by the Foreman on the payroll.

Chip Spreader: The operator moves the chipper into position setting the application rate and width to cover liquid bituminous area with aggregate. The operator and one or two crew members operate the chip spreader and verify the application rate for aggregate. The application rate for aggregate shall be +/- 20% of the design rate or field adjusted rate and documented by the Foreman on the payroll. A minimum of two Aggregate Yield Tests shall be performed each day, documenting date and location of the test, and be available for review.

Haul Trucks: A loaded truck is positioned and hooked to the chip spreader; care must be exercised not to spill excess aggregate onto the roadway. Cycling trucks in and out of the chip spreader will ensure an efficient operation.

Rollers: Immediately follow with an appropriate number of rollers to seat the aggregate in one pass. Steel wheel rollers are permissible on coarse aggregate application of Surface Treatment operations. Pneumatic Tire Roller ground contact pressure shall be 40 to 50 PSI. When the bituminous material has a tacky surface, back-roll the aggregates with a Pneumatic Tire Roller or a steel-wheel roller until the aggregate adheres to the bituminous material. Do not roll in the vibratory mode.

Mat Protection: Control of traffic through the work area is most important to achieve a high quality project. Keeping traffic off the fresh mat until an adequate cure has occurred is important. The use of a pilot vehicle should be used to control both traffic and speed on the recently completed mat (lane) and throughout the project.

Sweeping: Once the operation is completed on a roadway section and before the crew makes the return pass, sweep the untreated section of roadway to the treated section of the roadway. Sweeping shall not delay the operation, and shall not dislodge the aggregate from the existing treated roadway. By day's end, hills, curves and intersections shall be swept of excess aggregate, with an emphasis on sweeping the entire roadway by day's end. The entire roadway shall be swept clear of excess aggregate within 24 hours or sooner of the operation and shall be verified. The sweeping of the roadway, the day of and any day after, is incidental to the operation and shall be charged to this assembly.

Second Application #8 Aggregate

Distributors: The operator transfers a load of liquid bituminous material from the tanker, verifying the material type and temperature of each load. The operator then moves to the starting point for the day's work, setting the spray bar to the correct height and width to include "End Nozzles" for centerline. The distributor operator verifies that there is a uniform spray pattern and application rates for liquid bituminous material. The application rate shall be +/-10% of the design rate or field adjusted rate and documented by the Foreman on the payroll.

Chip Spreader: The operator moves the chipper into position setting the application rate and width to cover liquid bituminous area with aggregate. The operator and one or two crew members operate the chip spreader and verify the application rate for aggregate shall be +/- 20% of the design rate or field adjusted rate and documented by the Foreman on the payroll. A minimum of two Aggregate Yield Tests shall be performed each day, documenting date and location of the test, and be available for review.

Haul Trucks: A loaded truck is positioned and hooked to the chip spreader; care should be exercised not to spill excess aggregate onto the roadway. Cycling trucks in and out of the chip spreader will ensure an efficient operation.

Rollers: Immediately follow with an appropriate number of Pneumatic Tire Rollers to seat the aggregate in one pass. The Pneumatic Tire Roller ground contact pressure shall be 40 to 50 PSI.

Sweeping: Once the operation is completed on a roadway section and before the crew makes the return pass, sweep the untreated section of roadway to the treated section of the roadway. Sweeping shall not delay the operation, and shall not dislodge the aggregate from the existing treated roadway. By days end, hills, curves and intersections shall be swept of excess aggregate, with an emphasis on sweeping the entire roadway by days end. The entire roadway shall be swept clear of excess aggregate within 24 hours or sooner of the operation and shall be verified. The sweeping of the roadway the day of and consecutive days are incidental to the operation and charged to this assembly.

Mat Protection: Control of traffic through the work area is most important to achieve a high quality project. Keeping traffic off the fresh mat until an adequate cure has occurred is important. The use of a pilot vehicle should be used to control both traffic and speed on the recently completed mat (lane) and throughout the project.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements must be in place and maintained in accordance with Publication 213. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 27 Bulletin 27 Specifications-Special Bituminous Mixtures
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- Project Specific Mix Design (Required On Site)
- Oil – Aggregate Compatibility Test Results (Required on Site)
- Equipment Verification Documents - Forms M-214A through 214F (Required on Site)
- Yield Testing Equipment and Results to include Daily Production Reports (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7124-09
		EFFECTIVE DATE July 3,2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Surface Treatment – Seal Coat Stockpiling Material	None Established

Assembly Description Summary

This assembly shall only apply to the end of the surface treatment/seal coat operations where excess aggregate is stored for future use.

Production is **always** reported as Zero (0) gallons. An SR, segment and/or offset is not required when reporting this assembly.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies according to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	None Established	None Established

Method and Procedure:

This varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7125-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Hot Plant Mix – 1 inch Mechanized Paver Finisher - Paving	None Established

Assembly Description Summary

This assembly includes all actions related to the application of a uniform 1 inch bituminous paving operation by Department Force or Contract such as sweeping, application of tack coat, cutting pavement notches, placing of hot mix with bituminous Paver Finisher and compaction on paved roads in excess of 500 feet continuous length. Paved lengths of 500 feet or less shall be charged to assembly 711-7122.

Prior to the application of hot bituminous plant mix, all surface defects shall be repaired in accordance with the Maintenance Manual (Publication 23 Chapter 7). Roadway preparation work such as pothole patching, skin patching, crack sealing, base repair, etc., shall be charged to the appropriate assembly code. If needed, milling (711-7132-01) or a leveling course (711-7131-01) should be completed to re-establish the cross section of the roadway prior to completing this assembly. Particular attention should be given to removing wheel ruts of 1/2 inch or greater.

Paving shall be limited to the time period and temperature restrictions as specified in Publication 408 Sec. 409. The ambient temperature shall be 40º F and rising. Refer to Maintenance Manual Chapter 7 Maintenance Paving.

This work Shall be programmed on the M-213 and approved by the ADE – Maintenance.
The Work Zone Traffic Control set up shall be in accordance with Pub. 213. This assembly is typically a short-term, slow moving operation.

A training package has been prepared for this assembly. All personnel should review training materials prior to start of work. At a minimum, the Assistant Manager in charge of paving operations, foreman and core equipment operators (paver, roller, and distributor) shall complete the Surface Improvement Training (SIT) course within 2 years of performing this operation.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Bituminous
5	Equipment Operators		Hand Tools	Required	Material
4	Crew Members	1	Paver		
As req'd	Equipment Operators	2	Steel Wheel Rollers	As	
	(Haul)	1	Pneumatic Roller	Required	Tack Coat
3	Crew Members	1	Water Tank Truck		
	(Safety)	1	Power Broom		
		1	Distributor		
		As req'd	Haul Truck		
		1	Compressor and Breaker or Mechanical Milling Head		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Tons Code B	None Established	None Established

Method and Procedure:

Project foreman or Assistant Manager should communicate with the material vendor for order status type and quantities of material.

The limits of work shall be marked on the roadway. Paving notches to include intersecting roadways shall be cut in accordance to Pub. 72, RC-28. This should not delay the paving operation and shall be incidental to the paving assembly.

All surface repairs shall be completed prior to the beginning of this operation, and field verified. These assemblies shall be charged according to the operation preformed.

A roller pattern shall be established and documents on site to verify types and number of passes for each roller.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instruction to the work crew on the day's assemblies.

Site specific work zone shall be set up according to the current Pub. 213.

The roadway shall be swept clear of all loose debris and dried mud before the operation begins.

Approved tack coat is uniformly applied by a distributor at a rate of .05-.15 gallon per square yard which yields a residual rate of approximately .02-.07 gallon per square yard. The .05 gallon per square yard applications rate should be utilized on flushed/bleeding surfaces while heavier application rate of .15 gallon per square yard should be utilized on oxidized/porous pavement surfaces. Refer to the Maintenance Manual, Chapter 7, Tack Coat for additional details.

Trucks loaded with material arrive at the job site; material temperature is verified by a crew member. The truck is backed into the paver hopper, and then is pushed along by the paver as material is applied to the road surface.

The project foreman is to document actual field yields of material placed.

Crew members check paving quality and repair surface mat, as necessary, using hand tools.

A three wheel or vibratory tandem breakdown roller (minimum weight of 10 tons) compacts surface mat, followed by intermediate/finish rolling with a tandem roller. A pneumatic tire roller may be used for intermediate rolling. (Superpave compaction requirements may vary)

Mat temperature is to be monitored; allowing traffic on the completed mat after is reaches a temperature of < 140° F.

Crews should attempt to pull abutting lanes even by the end of the day in accordance with Pub 408 Section 401.

Adjustments to manholes, catch basins and similar structures shall be made to match the new finish grade. Municipalities should be contacted in advance and adjustments to their facilities coordinated with the paving operations.

The use of temporary pavement markings and signs shall be installed if existing markings were eradicated by the day's operation and should be charged to this cost function. After completion of the required work contact the Assistant Manager to have permanent markings replaced.

References and Essential items for this assembly

References:	**Essential Items :**
Pub 23 Maintenance Manual	First Aid Kit
Pub 445 Safety Policy Manual	Density Verification Tool
Pub 213 Work Zone Traffic Control	Yield Test Results
Pub 517 Job Safety Analysis	Cold Water
Pub 464 Maintenance Field Reference	Emergency Spill Kits
Pub 408 Highway Construction Specifications	Temperature Gauge
Pub 72M Roadway Construction Standards	

Note: Environmental concerns shall be considered, verify with the district environmental unit in the planning process.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7126-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Base/Sub-Base Repair Flexible Base – Light Duty	1.33 Ton/Man Hr.

Assembly Description Summary

This assembly includes all actions related to base/subbase repair operations such as removal of surface and base/subbase material, placing of U-drains and bleeders, adding new material and compaction on pie crust (pancake) and light duty roads. Pie crust road is defined as a roadway with less than two (2) inches total depth of bituminous surface including surface treatment build up.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

This assembly is typically a short-term stationary operation.

Environmental concerns such as wetlands, erosion control, and waterway pollution are to be addressed in the disposal of excavated materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	14 Tons/Hr.	Req'd.
3	Equipment Operators	1	F.E. Loader		Aggregate
2	Crew Members	1	Gradall, Backhoe		(#2A)
2	Equipment Operators (Haul)		Loader or Grader		
2	Crew Members (Safety)	2	Dump Trucks	As Required	Calcium Chloride
		1	3 Wheel Roller		(if needed)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton Code B	14 Tons/Hr.	100 Tons/Day

Method and Procedure:

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The prime cause of base failures is a lack of proper drainage. Major alligatoring and/or deflection cracking are good indications of base failure.

The majority of base failures will occur in the spring, or during extreme wet weather.

If large areas are being repaired or scarifying is necessary a grader and an operator should be added to the assembly requirements listed below.

Foreman identifies areas to be removed. Operator using a gradall, backhoe or loader removes all base and/or subbase material that has failed.

Crew replaces excavated material with proper aggregate. Aggregate is placed in no more than 4 inch lifts and compacted thoroughly with a roller. Build base to within 1/2 inch of adjacent pavement and place surface course.

Calcium chloride may be added to the aggregate to improve stability. It can be added in the following ways:

A. Pre mixed with aggregate (7 lb./ton 8.2% moisture)
B. Applied after compaction in liquid form
C. After compaction, apply flake calcium (1 1/2 lb./sq. yd.) and add water

The surface course should be placed as a separate assembly. Charge time for application of surface course to its appropriate assembly.

A. Skin Patch (Double Treatment)
B. Bituminous Patch

Cleanup Area

Additional Reference, Pub. 408, Section 305.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7126-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Base/Sub-Base Repair Flexible Base – Heavy Duty	.74 Ton/Man Hr.

Assembly Description Summary

This assembly includes all actions related to base/subbase repair operations, such as removal of surface and base/subbase material, placing drains and bleeders, new material, and compaction on flexible base (heavy duty) roads.

The Work Zone Traffic Control set up shall be erected in accordance with Publication #213. This assembly is typically a short-term stationary operation.

Environmental concerns such as wetlands, erosion control, waterway pollution are to be addressed in the disposal of excavated materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Subbase
2	Equip. Oper.	1	Backhoe, Loader	Required	Material
2	Crew Members		Gradall or Grader	As	
2	Equip. Oper. (Haul)	2	Dump Trucks	Required	BCBC/
2	Crew Members (Safety)	1	Compactor or Roller		Superpave
		1	Compressor and Pavt. Breaker or Concrete Saw	As Required	TOP

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton Code B	7 Tons/Hr.	50 Tons/Day

Method and Procedure:

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The prime causes of base failures are lack of proper drainage and poor sub grade material. Alligatoring and/or deflection cracking are good indications of base failure.

Base failures usually occur in the spring, or during extreme wet weather. Temperatures govern the use of plant mix material, thus during cold weather, a mixer paver can be used to mix a suitable base and surface course material.

Additional information on this activity can be found in Publication 408, Section 305.

Foreman marks areas to be cut out. The patch must be square or rectangular with the faces cut straight and vertical. The size of the patch must extend at least one foot into good pavement outside the cracked area. Crew Member, using an air hammer with a wide chisel, hydraulic breaker, or gas breaker, cut out edges of the patch.

Equipment operator using gradall or backhoe excavates all base and sub base material that has failed. Surface, sub base and sub grade material must be removed as deep as necessary to reach firm support. In areas where a water problem exists, some measure of drainage must be provided such as sub grade drains.

Crew replaces excavated material with #2A aggregate. Aggregate is placed in 6 inch lifts and compacted thoroughly with a wacker or roller. The depth of the new sub-base should be equal or deeper than that of the existing base.

Crew places bituminous binder or BCBC in no more than 4 inch lifts, into excavated area. Compact material thoroughly. Care must be taken that lifts do not exceed 4 inch and proper compaction is obtained. (Superpave mix lift requirements may vary with aggregate size.)

Crew replaces surface course using method described in activity 711-7121-01 (Manual Patching). If surface area to be replaced is too large to be manually patched a mechanized patch should be placed.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7126-03
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Base/Sub-Base Repair Rigid Base	.23 Ton/Man Hr.

Assembly Description Summary

This assembly includes all actions related to base/subbase repair operations, such as removal of surface and base/subbase material, placing of drainage, new material, and compaction.

When a temporary repair of a blowup is made to only the surface of the roadway, charge 711-7121.

When a temporary repair of a blowup is made with bituminous material on a rigid pavement charge to this activity.

The Work Zone Traffic Control set up shall be erected in accordance with Publication #213. This assembly is typically a short-term stationary operation.

Environmental concerns such as wetlands, erosion control, waterway pollution are to be addressed in the disposal of excavated materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab		
1-2	Equipment Operators	1	Compressor	As	Sub base
2	Equipment Operators (Haul)	1	Pavement breaker	Req'd.	Material
1-2	Crew Members	1	Backhoe or	As	
	(Safety)		Gradall	Req'd	BCBC/
		2	Dump Trucks		Superpave
		1	Compactor or	As	
			Roller	Req'd.	TOP
			Concrete Saw-		
			(Opt.)		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton Code B	2 Tons/Hr.	14 Tons/Day

Method and Procedure:

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The prime causes of base failures are lack of proper drainage and poor sub grade material. Alligatoring and/or deflection cracking are good indications of base failure.

Base failures usually occur in the spring, or during extreme wet weather. Temperatures govern the use of plant mix material.

Foreman marks areas to be cut out. The patch must be square or rectangular with the faces cut straight and vertical. The size of the patch must extend at least one foot into good pavement outside the cracked area. Crew member, using an air hammer with a wide chisel, hydraulic breaker, gas breaker, or pavement saw, cuts out edges of the patch.

Equipment operator using gradall or backhoe excavates all base and sub base material that has failed. Surface, sub base and sub grade material must be removed as deep as necessary to reach firm support. In areas where a water problem exists, some measure of drainage must be provided. If the cause is from seepage or from improper removal of surface water, then tile, pipe, or French drains must be used for under drain.

Crew replaces excavated material with #2A aggregate. Aggregate is placed in 6 inch lifts and compacted thoroughly with a wacker or roller. The depth of the new sub base should be equal to or deeper than that of the existing base.

Crew places bituminous binder or BCBC in no more than 4 inch lifts, into excavated area. Compact material thoroughly. Care must be taken that lifts do not exceed 4 inch and proper compaction is obtained. (Superpave mix lift requirements may vary with aggregate size.)

Crew replaces surface course using method described in assembly 711-7121-01 (Manual Patching). If surface area to be replaced is too large to be manually patched a mechanized patch should be placed.

Additional References: Publication 408, Section 305.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7126-04
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Base/Sub-Base Repair – Plant Mix Milling Machine and Widener Mechanized	3.33 Tons/Man Hour

Assembly Description Summary

This assembly is the placement of mechanized bituminous patches over surface distresses in limited areas. This includes all actions relating to high-productivity base/sub-base repair operations utilizing a milling machine and a mechanized widener, which includes full-depth and partial depth removal of bituminous material with a milling machine, adding bituminous base/sub-base material with a widener and compaction. Repairs made to the surface only shall be charged to 711-7122-05.

The depth of the base repair shall be no less than 3 inches and extend beyond the depth of the wearing course. Care must be taken to not exceed the depth of the adjacent pavement, as this may lead to future subsurface drainage problems.

The cross-section and profile of the repair area(s) shall match that of the existing roadway. Re-establishment of the pavement edge shall be equal to the roadway width as recorded in the straight-line-diagram (SLD) or to the width of the base material as indicated by field conditions.

Any pipe replacement or drainage corrections should be completed prior to this assembly and charged accordingly.

Waste materials shall not be placed in wetlands or waterways and must be stabilized. Rolling is acceptable stabilization. Consideration should be given to stockpile comingled milled material for uses such as shoulder stabilization.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Bituminous
3-4	Equipment Operators	8-10	Haul Trucks		Material
4-5	Crew Members	1	Milling Machine		
8-10	Equipment Operators (Haul)	1	Widener		
2-3	Crew Members	1-2	Rollers	As Required	TACK
	(Safety)	1	Skid Steer/Broom		
		1	Water Truck		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	55 Tons/Hour	350 Tons/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Waste Disposal: Arrangements for the disposal of waste material should be made in advance of the operation. Under no circumstances shall material be disposed in a wetland, water way or flood plain or be disposed on private property in such a manner that the material could be graded into any of these areas. Communicate the dump site locations to the crew. The Authorization to Enter and Deposit Material form M-666 and the Environmental Due Diligence form, D-1, shall be properly completed prior to the disposition of material onto private property. These forms require the property owner to follow proper erosion and sedimentation control measures. These forms must be on site.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Milling: Mark all potential hazards and repair limits prior to commencing milling operations. A milling machine mills out the deteriorated areas. All repair areas must extend into sound material both vertically and horizontally. Square off all rounded edges left by the milling machine prior to cleaning and tacking asphalt surfaces. Properly dispose of (or stockpile) all milled material.

Preparation:

Full Depth Repairs: A vibratory roller or 4-6 ton static roller is placed in the milled out section to compact the sub-base. Visual observation must be made to ensure there is no movement underneath the roller during compaction. If movement is observed then additional sub-base/sub-grade repair is required prior to placing bituminous material. Remove unsuitable material, compact, then place approved sub-base material in proper sized lifts and compact, matching the elevation of the adjacent sub-grade.

Partial Depth Repairs: Cleaning of the milled horizontal surfaces is required. All loose material shall be removed with particular attention given to the inside edges and corners of the milled areas.

Cleaning and TACK Application: Thoroughly clean all surfaces that are to come into contact with fresh asphalt by compressed/forced air, sweeping or brooming. Apply an approved TACK material to all existing asphalt surfaces that will come into contact with fresh asphalt. TACK coverage must be complete and uniform. Do not allow material to pond and allow time for the TACK to cure.

Filling: As the trucks arrive, check for the proper material type and temperature. Set the widener strike off plate to the proper height and profile to insure that the repair area matches the roadway grade and profile. A good rule of thumb is 1 1/4 inch un-compacted = 1 inch compacted. Adjust as necessary and monitor throughout the operation. Material lift thickness depends on the type of material being used and the depth of the repair, refer to Publication 242.

Compaction: Thoroughly clean all adjacent surfaces prior to compacting. Compaction is completed by a smooth drum vibratory roller properly sized for the width and depth of the patch (min. 4-6 tons). Pinch roll the edge, then roll the remainder of the patch. When large rollers are used, care should always be given to insure the roller drums do not bridge the patch area. Allow time for the material to cool before allowing traffic to run on the repaired areas. Clean up all loose debris and litter from the work area.

Markings and Signs: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines and center lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Follow-up: Repair areas should be sealed with a surface treatment or overlay within1year, not to exceed a total of 18 months. At a minimum the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently then that work is charged to assembly 711-7128-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- M666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (Required on Site)
- Form D-1 Environmental Due Diligence (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7127-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads - Paved Skin Patching Liquid Bituminous - Manual	5 Gal./Man Hr.

Assembly Description Summary

This assembly includes all actions related to liquid bituminous skin patching operations, such as sweeping, manual application of liquid bituminous material using a heating kettle, manually spreading cover aggregate and rolling on paved roads.

This assembly includes repairs to lightly alligatored sections not caused by base failure, and temporary repairs to more extensive alligator cracking.

The Maintenance Manual, Chapter 7, Skin Patching restricts application of emulsions to air temperatures of 60 F and above. Treatment of distressed pavements in colder weather is permissible to prevent more serious failures such as potholes. Skin patching during these colder periods should be confined to manual skin patching only.

Spray patching operations using patching machines such as AMZ, Roscoe, Roadpatcher, etc., shall be charged to 711-7121-04.

The Work Zone Traffic Control set up shall be erected in accordance with Publication #213. This assembly is typically a short-term, slow moving operation.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	44 Gals.	E-2
1	Equipment Operators	1	Dump Truck	Per Hr.	E-3
3	Crew Members	1	Heating Kettle		
1	Equip. Oper. (Haul)	1	Roller-Pneumatic		
2	Crew Members (Safety)		Brooms, Shovels, Squeegee, etc.	As Required	#1B-AASHTO #8

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon Code 5	44 Gal./Hr.	300 Gal./Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

Heat oil to appropriate temperature. E-2 and E-3 oils have a temperature application range between 140º F and 175º F.

Broom surface to be skin patched. Apply oil with a spray wand. Spread oil over entire area to be patched. Immediately drop #1B stone over oil, and seat with pneumatic roller or small steel wheel roller. Seating the aggregate is a necessity for a good skin patching operation.

Do not fan stone over the liquid bitumen because the aggregate has a tendency to roll through the oil, coating the entire stone instead of just the bottom. The approved method is to drop aggregate on the liquid bitumen with a flat shovel.

Clean up area by sweeping excess loose stones from roadway.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7127-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Skin Patching Liquid Bituminous - Mechanized	42 Gal./Man Hr.

Assembly Description Summary

This assembly includes all actions related to mechanized liquid bituminous skin pacthing of limited areas such as sweeping, application of liquid bituminous material and placing and seating the cover aggregate on paved roads. The sweeping and cleaning of the road prior to the operation as well as any incidental work after treatment, such as cleaning up aggregate, reapplication of aggregate made necessary by bleeding, etc., should be charged to this code.

This assembly is done when the areas to be treated are too extensive for manual skin patching, yet the condition of the road does not warrant a complete liquid bituminous surface treatment.

The Maintenance Manual, Chapter 7, Skin Patching restricts application of emulsions to air temperatures of 60º F and above. Treatment of distresed pavements in colder weather is permissible to prevent more serious failures such as (potholes). Skin patching during these colder periods should be confined to manual skin patching only.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213. This assembly is typically a short term, slow moving operation.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	600	
5-6	Equipment Operators	1	Distributor	Gal./hr.	E-2, E-3
2	Crew Members	1	Chip Spreader		
3	Equip. Oper. (Haul)	1	Pneumatic Roller		
2	Crew Members	1	Tow Broom	As Required	#1B Aggregate
	(Safety)	1	F.E. Loader		AASHTO #8
		3	Dump Trucks		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon Code 5	600 Gal./Hr.	4000 Gal./Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The distributor operator transfers a load of oil from the tank and heats to application temperature. He then moves to the starting point for the day's work, sets height, width, and nozzles of spray bar for the correct application width, adjust pump pressure, if necessary, and set tachometer for correct speed.

The chip spreader must also be set to correct width and rate of feed.

The roadway pavement must be free of all litter, debris, leaves, dried mud and soil, etc.

The distributor puts down a cover of hot bituminous material according to the foreman's directions. The application temperature range of E-2 and E-3 oil is 140º F – 175º F. Application rates routinely vary from 0.25 to 0.40 gallons per square yard.

The chip spreader immediately follows the distributor and applies a layer of aggregate at a rate varying between 15 – 25 pounds per square yard.

The operation of hauling aggregate must cycle trucks to keep the chip spreader working. An equipment operator and two crew members operate the spreader.

Immediately follow with a pneumatic roller to set aggregate in the bitumen.

It may be necessary to broom over the skin patch if there is loose aggregate after rolling. Spotty excess can be hand broomed.

Control of traffic through the work area is most important to achieve high quality work. The crew cab can be used as a pilot vehicle to keep traffic speeds below 25 M.P.H.

The use of temporary pavement markers may be required under the criteria outlined in Publication #213.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7127-03
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Skin Patching Manual – Distributor and Spray Wand	8 Gal./Man Hr.

Assembly Description Summary

This assemlby includes all actions related to liquid bituminous skin patching operations such as sweeping, application of liquid bituminous material using a distributor with spray wand, manually spreading cover aggregate and rolling on paved roads.

This assembly includes repairs to lightly alligatored sections not caused by base failure, and temporary repairs to more extensive alligator cracking.

Skin patching applied to paved roads is one of the best preventive maintenance activities in deterring the formation of potholes.

The Maintenance Manual, Chapter 7, Skin Patching restricts application of emulsions to air temperatures of 60º F and above. Treatment of distressed pavements in colder weather is permissible to prevent more serious failures such as potholes. Skin patching during these colder periods should be confined to manual skin patching only.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

This assembly is typically a short term, slow moving operation.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	90 Gal.	
2	Equipment Operators	1	Distributor and	Per Hr.	E-2, E-3
3	Crew Members		Spray Wand		
2	Equip. Oper. (Haul)	2	Dump Trucks		
2	Crew Members (Safety)	1	Roller-Pneumatic	As Required	#1B Aggregate #8 AASHTO

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon Code 5	90 Gal./Hr.	600 Gal./Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The distributor operator transfers a load of oil from the tank, travels to the starting point of the day's work and heats the oil to the required application temperature. The application temperature range for E-2 and E-3 oil is 140º F - 175º F.

The roadway must be free of all litter, debris, leaves, mud, loose stone, etc.

Crew member uniformly sprays area to be skin patched using spray wand from distributor. Application rates routinely vary from 0.25 to 0.40 gallon per square yard.

Immediately cover oil with a layer of 1-B aggregate applied at a rate varying between 15-25 pounds per square yard. The approved method is to drop aggregate on the liquid bitumen with a flat shovel. Do not fan aggregate over the bitumen because the aggregate has a tendency to roll through the oil, coating the entire stone instead of just the bottom.

Immediately after placement of the aggregate, seat with a pneumatic tire roller or small steel wheel roller.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7127-09
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Skin Patching Stockpiling Cost Only	None Established

Assembly Description Summary

This assembly includes all actions related to stockpiling (hauling) costs for skin patching operations prior to actually performing the work when the location of work is not known. Under no circumstances shall site preparation hauling aggregate to the chipper, finishing work etc. be charged to this Method 09 code. When the operation begins Method 01 shall be charged.

Production is always reported as zero (0) gallons. An SR, segment and or offset is not required when reporting this Method.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Zero (0)	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7128-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Crack Sealing – Bituminous Surface Manual	None Established

Assembly Description Summary

This assembly is the sealing of cracks in bituminous surfaces with pre-packaged material. This includes heating the material, cleaning of cracks, applying material and wiping the material flush on rigid or flexible base roads. The objective of this operation is to prevent more serious pavement distress such as base failures or potholes. Refer to Publication 23.

The required Liquid Asphalt Safety and Tar Kettle training for this assembly can be found in Publication 235 along with the frequency of the training.

Crack Sealing should be performed when ambient temperature is between 40˚F and 90˚F. Unless with approval from the District Executive, do not place sealant when the air temperature is below 40˚F or above 90˚F.

This work is to be included in the M-213 Program and approved by the ADE-Maintenance.

At a minimum, the application operators and the kettle operators shall have completed the Crack Sealing, Maintenance Activity Training (MAT) course within the past 2 years.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Prepackaged
1-2	Equipment Operators	1-2	Haul Trucks		Material
3-5	Crew Members	1	Double Boiler Kettle		
2	Crew Members	1	Air Compressor		
	(Safety)	1	Squeegee/Equivalent		
		1	Hot Compressed Air Lance (optional)		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Lane Mile	None Established	None Established

Method and Procedure:
Prior to the beginning of work the Foreman shall give the appropriate required safety talk; review Publication 517 and provide general instructions to the work crew on the day's assemblies. It is mandatory to be in compliance with Publication 445. Water shall be on site to cool the hot liquid in the event that sealant material comes in contact with personnel. Only single well defined cracks, 1/4 inch to 1 inch in width shall be sealed. Areas that have multiple cracks or cracks less than 1/4 inch wide should be skin patched.

Cleaning: The cracks shall be thoroughly cleaned of all dirt, dust, vegetation and/or foreign materials using consistent compressed air of 100 P.S.I. at the source or a hot compressed air lance.

Drying: It is required that all cracks be dry. A hot compressed air lance shall be used to dry all damp cracks. Care must be taken so as to not burn, scorch, or damage the pavement when using the hot compressed air lance.

Sealing Equipment: A "double boiler" style kettle with calibrated temperature gauges and full sweep agitator shall be used. Calibration to be done as per manufacturer's recommendation.

Materials: Only pre-packaged materials are accepted for use. It is also important to heat and apply the sealant being used to the manufacturer's specifications both for quality performance and safety concerns. The temperature limits as listed on the outside of the shipping package or Material Data Sheet shall be adhered to at all times.

Sealing: All warranted cracks shall be uniformly filled and sealed. Cracks shall be sealed by placing the applicator wand in or directly over the crack and carefully placing the proper amount of sealant to just fill the crack. In all circumstances the material shall be wiped flush with the pavement surface leaving a thin film of sealant 1/32 inch to 1/16 inch thick and from 1 inch to 3 inches wide. Cracks that vary in width within the prescribed parameters shall be sealed along their entire length. Sealant shall not overlap, run together, or cause a dense amount of sealant to accumulate. Do not place sealant when the air temperature is below 40˚F or above 90˚F. Areas that have multiple cracks or cracks less than 1/4 inch wide should be skin patched.

Routing: Routing is recommended for transverse and single random cracks when the pavement is less than 5 years old and is not scheduled for resurfacing for at least 2 years. When routing is required, rout the cracks to create a reservoir 1/2 inch deep. Do not rout areas that contain a significant amount of old sealant material. Create a reservoir for sealant material with the router that has the approximate dimensions of 1/2 inches wide by 1/2 inches in depth. The pavement layer on which cracks are being sealed must be a minimum of 1 1/2 inches in depth.

Traffic Control: All traffic shall be kept off fresh material until it is cured. When necessary, a detack solution can be used to eliminate sealant pick-up and tracking.

Markings and Signage: Temporary pavement markings and signs shall be installed and maintained if existing markings were eradicated by the day's operation and should be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings, if required.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 235 Equipment Operator Instructor Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 517 Job Safety Analysis (Required on Site)
- Burn Kit
- Cold Water
- Cool Water (Required on Site for burns)
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7131-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Leveling Course – Hot Plant Mix Mechanized – Tow or Finisher Paver	2.77 Tons/Man Hr

Assembly Description Summary

This assembly includes all actions related to applying a Leveling Course to re-establish the roadway cross section using a Paver Finisher or Tow Paver in excess of 500' continuous length.

The approved hot plant mix bituminous material shall be applied in accordance with Chapter 7 of the Maintenance Manual.

The depth of the 9.5 mm Fine-Graded Superpave Mix Leveling Course will vary according to field conditions but should be applied at a minimum rate of 60-110 lbs. per square yard averaged over the length of the project.

Reference Publication 242 Table 10.7 for SuperPave material thickness requirements.

An additional application of hot plant mix or bituminous seal coat normally follows the application of the leveling course.

Paving shall be limited to the time period and temperature restrictions as specified in Publication 408 Sec. 409. The ambient temperature shall be 40º F and rising. Refer to Maintenance Manual Chapter 7 Maintenance Paving.

This work shall be programmed on the M-213 and approved by the ADEM-Maintenance.

The Work Zone Traffic Control set up shall be in accordance with Pub. 213 This assembly is typically a short-term, slow moving operation.

A training package has been prepared for this assembly. All personnel should review training materials prior to start of work. At a minimum, the Assistant Highway Maintenance Manager in charge of paving operations, foreman and core equipment operators (paver, roller, and distributor) shall complete the Surface Improvement Training (SIT) course within 2 years of performing this operation.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Bituminous
5	Equipment Operators	1	Paver	Required	Material
4	Crew Members	2	Steel Wheel Rollers		
As req'd	Equip. Operators	1	Pneumatic Roller	As	
	(Haul)	1	Water Tank Truck	Required	Tack Coat
3	Crew Members	1	Power Broom		
	(Safety)	1	Distributor		
		As req'd	Haul Truck		
		1	Compressor and Breaker or Mechanical Milling Head		
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Tons Code B	35 Tons/Hr.	250 Tons/Day

Method and Procedure:
Project foreman or Assistant Manager should communicate with the material vendor for order status type and quantities of material.

The limits of work shall be marked on the roadway; paving notches to include intersecting roadways shall be cut in accordance to Pub. 72 RC-28. This should not delay the paving operation and shall be incidental to the paving assembly.

All surface repairs shall be completed prior to the beginning of this operation, and field verified. These assemblies shall be charged according to the operation performed.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instruction to the work crew on the day's assemblies.

Site specific work zone shall be set up according to the current Pub. 213.

The roadway shall be swept clear of all loose debris and dried mud before the operation begins.

Approved tack coat is uniformly applied by a distributor at a rate of .05-.15 gallon per square yard which yields a residual rate of approximately .02-.07 gallon per square yard. The .05 gallon per square yard applications rate should be utilized on flushed/bleeding surfaces while heavier application rate of .15 gallon per square yard should be utilized on oxidized/porous pavement surfaces. Refer to the Maintenance Manual, Chapter 7, Tack Coat for additional details.

Trucks loaded with material arrive at the job site; material temperature is verified by a crew member. The truck is backed into the paver hopper, and then is pushed along by the paver as material is applied to the road surface.

The project foreman is to document actual field yields of material placed.

Crew members check paving quality and repair surface mat, as necessary, using hand tools.

A three-wheel or vibratory tandem breakdown roller (minimum weight of 10 tons) compacts the surface mat. A pneumatic tire roller must be used when placing material at < 90 lbs. per square yard.

Mat temperature is to be monitored; allow traffic on the completed mat after is reaches a temperature of < 140° F.

Crews should attempt to pull abutting lanes even by the end of the day in accordance with Specification 408, Section 401

Adjustments to manholes, catch basins and similar structures shall be made to match the new finish grade. Municipalities should be contacted in advance and adjustments to their facilities coordinated with the paving operations.

The use of temporary pavement markings and signs shall be installed if existing markings were eradicated by the day's operation and should be charged to this cost function. After completion of the required work contact the Assistant Manager to have permanent markings replaced.

(References and Essential items for this assembly)

References:	**Essential Items :**
Pub 23 Maintenance Manual	First Aid Kit
Pub 445 Safety Policy Manual	Yield Test Results
Pub 213 Work Zone Traffic Control	Temperature Gauge
Pub 517 Job Safety Analysis	Cold Water
Pub 464 Maintenance Field Reference	Emergency Spill Kits
Pub 408 Highway Construction Specifications	
Pub 72M Roadway Construction Standards	
Pub 242 - Pavement Policy Manual	

Note: Environmental concerns shall be considered, verify with the district environmental unit in the planning process.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7131-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Leveling Course – FB Mix Mechanized – Mixer Paver	3.10 Tons/Man Hr

Assembly Description Summary

This assembly includes all actions related to applying a Leveling Course to re-establish the roadway cross section using a Mixer Paver. To place a layer of a blended mix of liquid bituminous and aggregate (FB-1 or FB-2) in excess of 500' continuous length; such as sweeping, applying mix to road surface and compaction on paved roads.

All surface failures must be studied carefully before repair work is started. Determining and correcting causes of failure is the only way to make permanent repairs.

Paving shall be limited to the time period and temperature restrictions as specified in Publication 408 Sec. 422 and 430. Refer to Maintenance Manual Chapter 7, Maintenance Paving.

This material is normally applied on Type 30 roads with an ADT of 1500 or less and normally applied at the rate of 60 to 90 lbs./Sq. Yd., for FB-1 or FB-2 Wearing Course or 160 to 220 lbs./Sq. Yd. for FB-1 or FB-2 Binder Course.

Application of material is accomplished in accordance with Chapter 7 of the Maintenance Manual and Pub 408 Section 439-Bituminous Wearing Course FB-1, Section 430-Bituminous Wearing Course FB-2, Section 440-Bituminous Binder Course, FB-1, Section 430-Bituminous Binder Course FB-2.

Field conditions will determine whether a seal coat is placed during the same or succeeding construction season.

The Work Zone Traffic Control set up shall be in accordance with Pub. 213. This assembly is typically a short-term, slow moving operation.

This work Shall be programmed on the M-213 and approved by the ADE – Maintenance.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	850	E4/E5
5	Equipment Operators	1	Distributor	gals/hr.	
As req'd	Equipment Operators	1	Mixer Paver		
	(Haul)	1	Steel Wheel Rollers		
4	Crew Members	1	Front End Loader	47	Aggregate
		1	Sand Truck	tons/hr.	
3	(Safety)	As req'd	Haul Trucks		
		1	Power Broom		
		1	Water Truck	As Required	Sand

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Tons Code B	47 Tons/Hr.	325 Tons/Day

Method and Procedure:
All surface repairs shall be completed prior to the beginning of this operation, and field verified. These assemblies shall be charged according to the operation preformed.

The limits of work shall be marked on the roadway

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instruction to the work crew on the day's assemblies.

Site specific work zone shall be set up according to the current Pub. 213.

Notches are not required to be cut.

A tack coat application is not required with FB mixes.

The roadway shall be swept clear of all loose debris and dried mud before the operation begins.

Oil/Aggregate compatibility tests and mix designs shall be completed before work begins.

Fill distributor from the tanker or storage tank in county yard. The oil must be at working temperature before transfer to mixer paver. Working temperature of E-4 or E-5 is between 100º F and 160º F.

Position mixer pavers on pavement, fill oil tanker from distributor, ignite burners to maintain oil at application temperature.

Deposit aggregate in hopper on mixer paver from hauling trucks. The progress of the operation is dependent on a continuous supply of aggregate to the mixer paver so sufficient trucks must be supplied.

Start plant mixing aggregate and oil and feed into spreader section. It is important that all stones are oil coated before application on roadway. Begin forward motion and apply mix at required depth and width to restore a proper cross section to the road.

One crew member should follow mixer/paver on each side of the operation to straighten edges and fill in spots as required.

The project foreman is to document actual field yields of material placed.

Feather the ends of the patch and the edge across intersecting roadways.

Compaction is accomplished with a tandem and three wheel roller.

After initial compaction, apply 3-5 lbs./sq. yd. of fine aggregate and finish rolling. One operator operates both the fine aggregate and water truck.

Adjustments to manholes, catch basins and similar structures must be made to match the new finish grade. Municipalities should be contacted in advance and adjustments to their facilities coordinated with the paving operations.

The use of temporary pavement markings and signs shall be installed if existing markings were eradicated by the days operation and should be charged to this cost function. After completion of the required work contact the Assistant Manager to have permanent markings replaced.

(References and Essential items for this assembly)

References:	**Essential Items :**
Pub 23 Maintenance Manual	First Aid Kit
Pub 445 Safety Policy Manual	Oil-Aggregate Compatibility Test Results
Pub 213 Work Zone Traffic Control	Yield Test Results
Pub 517 Job Safety Analysis	Temperature Gauge
Pub 464 Maintenance Field Reference	Cold Water
Pub 408 Highway Construction Specifications	Emergency Spill Kits
	Equipment Specific Verification Forms
	Pavement Mix Designs-Route Specific
	Daily Production Report

Note: Environmental concerns shall be considered, verify with the district environmental unit in the planning process.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7131-09
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Leveling Course – Mixer Paver Stockpile Costs Only	None Established

Assembly Description Summary
This assembly includes all actions related to stockpiling (hauling) costs for a mixer paver leveling course prior to actually performing the work. Under no circumstances shall site preparation, hauling aggregate to the mixer paver, finishing work, etc., be charged to this Method 09 code. When the operation begins assembly 711-7131-02 shall be charged.

Production is always reported as zero (0) tons. An SR, segment and/or offset is not required when reporting this Method.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Zero (0) Tons Code B	None Established	None Established

Method and Procedure:
Varies according to job requirements.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7132-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Milling of Bituminous Surface Mechanized	None Established

Assembly Description Summary
This assembly includes all actions related to pavement milling such as removing material, loading material and clean up on paved surfaces.

The Work Zone Traffic control set up shall be erected in accordance with Pub. #213.

Environmental concerns such as wetlands, erosion control and waterway pollution are to be addressed in the storage and disposition of milled materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stablization.

Refer to Maintenance Manual, Chapter 7, Milling, Leveling and Bituminous Surface Treatment.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Square Yards Code A	None Established	None Established

Method and Procedure:
Varies according to job requirements.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7132-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Spot Milling/Heat Scarifying of Bituminous Surface Mechanized	None Established

Assembly Description Summary
This assembly includes all actions related to spot pavement milling such as blow up removal, loading material and clean up on paved surfaces.

The Work Zone Traffic control set up shall be erected in accordance with Pub. #213.

Environmental concerns such as wetlands, erosion control and waterway pollution are to be addressed in the storage and disposition of milled materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

Waste material shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

Refer to Maintenance Manual, Chapter 7, Milling, Leveling and Bituminous Surface Treatment.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
Varies	According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Square Yards Code A	None Established	None Established

Method and Procedure:
Varies according to job requirements.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7133-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Recycling - Bituminous Mobile Plant Mechanized	None Established

Assembly Description Summary
This assembly is the application of recycled bituminous material on an existing bituminous roadway using a mechanized mobile plant. This includes all hauling, set-up, calibration/verification, handling millings, mixing, placement, compaction and traffic control. All work shall be completed in accordance with Publication 27 and Publication 242, and is to be programmed on the M-213, approved by the ADE-Maintenance.

"THIS IS NOT A FULL DEPTH RECLAMATION PROCESS (FDR)"

As part of preparation for this assembly, the RAP material shall be sampled to determine gradation and asphalt content. A mix design shall be developed for liquid bituminous and aggregates, along with application rates, before work begins, as per Publication 27 and approved by the District Materials Engineer/Manager or designee. A compatibility test shall be performed; this is completed by the liquid bituminous vendor. Copies of the liquid bituminous and aggregate compatibility tests as well as the mix designs shall be on site and available for review. Additional aggregate may be required for base course applications.

Do not place base course from September 1 to April 30 in Districts 1-0, 2-0, 3-0, 4-0, 9-0, and 10-0; and from October 1 to April 30 in all other districts.

Reclaimed asphalt pavement (RAP) shall be stored in compliance with current PennDOT policy and due diligence. This material cannot be used as site fill. Required run-off controls will be properly installed.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation, performed under a daylight road closure.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab		
2	TEOS	1	Milling Machine	As Required	Milled Material
12	Crew Members	1	Crusher		(RAP)
3	Crew Members		(400 Tons/hour)		
	(laborer)	1	Distributors		
		1	Mobil Mixer Paver	As Required	Liquid
		2	Steel Wheel Vibratory		Bituminous
			Rollers		
		1	Sand Truck		
		1	Water Truck		
		1	Pneumatic Tire Roller	As Required	Aggregate
		1	Broom		
		1	Loader		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sq. Yd.	None Established	None Established

Method and Procedure:
Prior to the beginning of each work day, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The limits of work shall be marked on the roadway in advance of the operation. Paving notches, to include intersecting roadways, shall be cut in accordance to Publication 72, RC-28. These should not delay the paving operation and shall be incidental to the assembly.

Milled Material Preparation: Before milled material can be blended, it shall be properly sized for application, as per the design requirements. A crusher screen process is used to obtain the adequate aggregate gradation.

(Optional) **Removal of existing surface:** Mill existing surface to the desired depth according to the design for the roadway. A process of sizing the material to the required gradation must be in place. The dry material is directly placed on the roadway or into a mixer/blending machine.

Sweeping: The entire roadway shall be swept clear of all debris before the operation begins.

TACK: TACK is not required for cold recycled pavement courses applied on existing bituminous surfaces.

Material Mixing/Blending: The material is hauled from the stock site and loaded into the mixer paver. Set the depth and width to match the design for this roadway. Maintain adequate total liquids in the mixture to ensure thorough coating/mixing of the reclaimed material and aggregates with the liquid bituminous material per the mix design. Field adjustments to the moisture or liquid bituminous content may be necessary. Adding water aids in the mixing process, adjust the moisture content first.

Material Placement: The mixer paver places the material on a properly prepared roadway surface, preferably in one single pass. The profile and cross section should be controlled to correct irregularities in the existing roadway surface, as well as maintaining the desired yield. Crew members shall correct any deficiencies in the mat such as holes, uneven edges, drag marks, etc., using hand tools. Provide transitions at driveways and intersections as required. Paver speed should be controlled to match the flow of material to the paver. Stopping of the paver will result in the screed settling in the fresh mat.

Compaction: Sufficient time should be allowed prior to compaction, to allow for the emulsion to break, allowing as much water as possible to evaporate from the mix. A roller pattern shall be developed (an Electrical Impedance device is acceptable), targeting maximum achievable density. A tandem steel wheel vibratory roller is used as the breakdown roller, followed by a Pneumatic Tire Roller. A tandem steel wheel roller in static mode is then used as a finish roller. Variations on this are acceptable as long as maximum density is achieved as per the roller pattern document. Periodic density checks shall be performed throughout the project to ensure maximum density is achieved. If the results of these density checks indicate a change, or some other factor changes, a new roller pattern should be developed. Back rolling of the previous day's placement may be useful in removing any remaining tire marks and to aid in additional compaction.

Follow-Up Activities: The completed pavement must be exposed to1month of warm weather, and should be sealed with a surface treatment or overlay within1year, not to exceed18 months.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements must be in place and maintained in accordance with Publication 213. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 27, Bulletin 27
- Pub 213 Work Zone Traffic Control (Required On Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required On Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required On Site)
- Roller Pattern Document (Required On Site)
- Project Specific Mix Design (Required On Site)
- Oil – Aggregate Compatibility Test Results (Required on Site)
- Temperature Gauge (Required On Site)
- Cold Water (Required On Site)
- First Aid Kit (Required On Site)
- Emergency Spill Kits (Required On Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7133-02
		EFFECTIVE DATE

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Recycling - Bituminous Central Mix Plant Mechanized	None Established

Assembly Description Summary

This assembly is the application of Recycled Asphalt Material (RAP) on an existing bituminous roadway using a central mixing plant. This includes but is not limited to gradation (material sizing), equipment verification /setup, proper handling of milled material, hauling, to include material placement, compaction and traffic control.

As part of preparation for this assembly, material from the stockpile or pavement cores shall be sampled to determine gradation, and asphalt content of the Recycled Asphalt Material (RAP). A mix design shall be developed for liquid bituminous and aggregates, along with application rates, before work begins, as per Publication 27 and approved by the District Materials Engineer / Manager or designee. A compatibility test must be performed; this is completed by the liquid bituminous vendor. Copies of the oil and aggregate compatibility tests as well as the mix designs shall be on site and available for review. The addition of aggregate may be required for base course applications.

This work shall be limited to low volume (<2000 ADT) roads and be programmed on the M-213 and approved by the ADE - Maintenance.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation, performed under a daylight road closure.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Milled Material
2	TEOS	1	Dozer	Required	(RAP)
12	Crew Members		Or Track Excavator		
3	Crew Members	1	Large Loader		
	(laborer)	1	Crusher (400 Ton/hour)	As	Liquid
		1	Pugmill	Required	Bituminous
		1	Milling Machine		
		1	Finish Paver		
		2	Steel Wheel Vibratory Rollers		
		1	Pneumatic Tire	As	Aggregate
			Roller	Required	
		6	Haul Trucks		
		1	Broom		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sq. Yd.	None Established	None Established

Method and Procedure:
The Assistant Manager and Foreman shall insure that enough trucks for hauling from the pugmill to the paver are available to permit continual operation based on haul distance, mat thickness and paver speed. Prior to the beginning of each work day, the foreman will give the required safety talk and provide general instructions to the work crew on the day's activities.

Material Preparation: At the stock site the material shall be properly sized to the design specifications for the application being used. Operators will feed the material through a crusher/screen to size the material just prior to it being loaded in the pug mill for blending with liquid bituminous material.

Marking: The limits of work shall be marked on the roadway in advance of the operation. Paving notches to include intersecting roadways shall be cut in accordance to Publication 72 - RC-28. These should not delay the paving operation and shall be incidental to the assembly.

Sweeping: The roadway shall be swept clear of all debris before the assembly begins.

TACK: TACK is not required for cold recycled pavement courses applied on existing bituminous surfaces.

Material Mixing/Blending: Maintain adequate total liquids in the mixture to ensure thorough coating/mixing of the recycled material and aggregates with the liquid bituminous material per the mix design. Field adjustments to the moisture or liquid bituminous content may be necessary. Adding water aids in the mixing process, adjust the moisture content first.

Hauling: The mixed RAP material shall be discharged directly into a haul truck, and then delivered to the paver for placement. Sufficient material should be delivered to allow for continuous movement of the paver.

Material Placement: The paver places the material on a properly prepared roadway surface, preferably in one single pass. The profile and cross section shall be controlled to correct irregularities in the existing roadway surface, and to maintain the desired yield. Crew members shall correct any deficiencies in the mat as well as any holes, uneven edges, drag marks etc. using hand tools. Provide transitions at driveways and intersections as required. Paver speed should be controlled to match the flow of material to the paver. Stopping of the paver will result in the screed settling in the fresh mat.

Compaction: Sufficient time should be allowed prior to compaction, to allow for the emulsion to break, and to allow for as much water as possible to evaporate from the mix. A roller pattern shall be developed (an Electrical Impedance device is acceptable), targeting maximum achievable density. A tandem steel wheel vibratory roller is required to be used as the breakdown roller, followed by a Pneumatic Tire Roller, this shall be required. A tandem steel wheel roller in static mode is then used as a finish roller. Variations on this are allowed as long as maximum density is achieved by the roller pattern document. Periodic density checks should be performed throughout the project to ensure maximum density is achieved. If the results of these density checks indicate a change, or some other factor changes, a new roller pattern should be developed. Back rolling of the previous day's placement may be useful in removing any remaining tire marks, and to aid in additional compaction.

Follow-Up Activities: The completed pavement should be allowed to cure for a minimum of two weeks prior to the placement of a seal coat, surface treatment, or bituminous overlay. At a minimum, the surface should be sealed in the same calendar year.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines and centerlines covered or destroyed during the day's operations with applicable pavement marking patterns. After completion of the required work contact the Assistant Manager to have permanent markings replaced.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 27, Bulletin 27
- Pub 213 Work Zone Traffic Control (Required On Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required On Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required On Site)
- Roller Pattern Document (Required On Site)
- Project Specific Mix Design (Required On Site)
- Oil – Aggregate Compatibility Test Results (Required on Site)
- Temperature Gauge (Required On Site)
- Cold Water (Required On Site)
- First Aid Kit (Required On Site)
- Emergency Spill Kits (Required On Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7133-03
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Paved Recycling – Bituminous Full Depth (FDR) Mechanized	None Established

Assembly Description Summary
This assembly includes all actions related to the contract application of a Full Depth Reclamation (FDR).

Refer to Publication 23.

The Department's standard is provided in Publication 408 Section 300, Publication 242.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sq. Yd.	None Established	None Established

Method and Procedure:
To be completed per contract.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7133-09
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads – Paved Recycling – Bituminous Stockpiling Costs Only	None Established

Assembly Description Summary

This assembly includes all actions related to stockpiling (hauling costs) for recycling operations prior to actually performing the work when the location of work is not known. Under no circumstances shall site preparation and/or hauling material for actual placement be charged to this Method 09 code. When the operation begins Method 01 shall be charged.

Production is always reported as zero (0) square yards when charging this assembly.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Zero (0) Square yds. Code A	None Established	None Established

Method and Procedure:

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7135-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Roads – Paved Hot Plant Mix – 1 ½” Mechanized Paver Finisher Paving	None Established

Assembly Description Summary

This assembly includes all actions related to the application of a uniform 1 1/2" (or greater) bituminous paving operation by Department Force or Contract such as sweeping, application of tack coat, cutting pavement notches, placing of hot mix with bituminous paver finisher and compaction on paved roads in excess of 500 feet continuous length. Paved lengths of 500 feet or less shall be charged to assembly 711-7122.

Prior to the application of hot bituminous plant mix, all surface defects shall be repaired in accordance with the Maintenance Manual (Publication 23-Chapter 7). Roadway preparation work such as pothole patching, skin patching, crack sealing, base repair, etc., shall be charged to the appropriate assembly code. If needed, milling (711-7132-01) or a leveling course (711-7131-01) should be completed to re-establish the cross section of the roadway prior to completing this assembly. Particular attention should be given to removing wheel ruts of 1/2 inch or greater.

Paving shall be limited to the time period and temperature restrictions as specified in Publication 408 Sec. 409. The ambient temperature shall be 40º F and rising. Refer to Maintenance Manual Chapter 7 Maintenance Paving.

This work shall be programmed on the M-213 and approved by the ADE – Maintenance.

The Work Zone Traffic Control set up shall be in accordance with Pub. 213. This assembly is typically a short-term, slow moving operation.

A training package has been prepared for this assembly. All personnel should review training materials prior to start of work. At a minimum, the Assistant Manager in charge of paving operations, foreman and core equipment operators (paver, roller, and distributor) shall complete the Surface Improvement Training (SIT) course within 2 years of performing this operation.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Bituminous
5	Equipment Operators		Hand Tools		Material
4	Crew Members	1	Paver		
As req'd	Equipment Operators	2	Steel Wheel Rollers		
	(Haul)	1	Pneumatic Roller		
3	Crew Members	1	Water Tank Truck	As Required	Tack Coat
	(Safety)	1	Power Broom		
		1	Distributor		
		As req'd	Haul Truck		
		1	Compressor and Breaker or Mechanical Milling Head		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Tons Code B	None Established	None Established

Method and Procedure:
Project foreman or Assistant Manager should communicate with the material vendor for order status type and quantities of material.

The limits of work shall be marked on the roadway; paving notches to include intersecting roadways shall be cut in accordance to Pub. 72 RC-28. This should not delay the paving operation and shall be incidental to the paving assembly.

All surface repairs shall be completed prior to the beginning of this operation, and field verified. These assemblies shall be charged according to the operation preformed.

A roller pattern shall be established and documents on site to verify types and number of passes for each roller.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instruction to the work crew on the day's assemblies.

Site specific work zone shall be set up according to the current Pub. 213.

The roadway shall be swept clean of all loose debris and dried mud before the operation begins.

Approved tack coat is uniformly applied by a distributor at a rate of .05-.15 gallon per square yard which yields a residual rate of approximately .02-.07 gallon per square yard. The .05 gallon per square yard applications rate should be utilized on flushed/bleeding surfaces while heavier application rate of .15 gallon per square yard should be utilized on oxidized/porous pavement surfaces. Refer to the Maintenance Manual, Chapter 7 Tack Coat for additional details.

Trucks loaded with material arrive at the job site; material temperature is verified by a crew member. The truck is backed into the paver hopper, and then is pushed along by the paver as material is applied to the road surface.

The project foreman is to document actual field yields of material placed.

Crew members check paving quality and repair surface mat, as necessary, using hand tools.

A three wheel or vibratory tandem breakdown roller (minimum weight of 10 tons) compacts surface mat, followed by intermediate/finish rolling with a tandem roller. A pneumatic tire roller may be used for intermediate rolling. (Superpave compaction requirements may vary)

Mat temperature is to be monitored; allowing traffic on the completed mat after is reaches a temperature of <140° F.

Crews should attempt to pull abutting lanes even by the end of the day in accordance with Specification 408, Section 401.

Adjustments to manholes, catch basins and similar structures shall be made to match the new finish grade. Municipalities should be contacted in advance and adjustments to their facilities coordinated with the paving operations.

The use of temporary pavement markings and signs shall be installed if existing markings were eradicated by the days operation and should be charged to this cost function. After completion of the required work contact the Assistant Manager to have permanent markings replaced.

(References and Essential items for this assembly)

References:	**Essential Items:**
Pub 23 Maintenance Manual	First Aid Kit
Pub 445 Safety Policy Manual	Density Verification Tool
Pub 213 Work Zone Traffic Control	Yield Test Results
Pub 517 Job Safety Analysis	Temperature Gauge(s)
Pub 464 Maintenance Field Reference	Cold Water
Pub 408 Highway Construction Specifications	Emergency Spill Kits
Pub 72M Roadway Construction Standards	

Note: Environmental concerns shall be considered, verify with the district environmental unit in the planning process.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7136-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Roadway Pavement Widening with B.C.B.C.	None Established

Assembly Description Summary

This assembly includes all actions related to the widening of paved roadways such as scarifying, shaping, and/or removing existing material, the addition of Bituminous Concrete Base Course (B.C.B.C.), shaping and compacting.

The areas to be widened shall be confined to C, D & E system roadways, shall be programmed on the M-213 program, and shall be approved by the District Executive.

The widening shall consist of a minimum of 2 feet. If both sides of the roadway are to be widened, it shall consist of a minimum of 2 feet on each side.

Refer to Maintenance Manual, Chapter 7, Widening.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

Environmental concerns such as wetlands, erosion control and waterway pollution are to be addressed in the disposal of excavated materials. Refer to Maintenance Manual, Pub. #23, Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Tons Code B	None Established	None Established

Method and Procedure:
Varies according to Job Requirements.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The depth of the widened pavement shall match the depth of the existing pavement or be determined by the following criteria, whichever is less:

A. 4" B.C.B.C. plus 1" surface course over the entire roadway placed within one year of completion of the widening.

B. 5" B.C.B.C. plus a seal coat over the widened area placed within one year.

The existing pavement edges shall be properly cleaned and a tack coat applied in accordance with specification 408, Section 401.3(f) prior to placement of B.C.B.C.

Straw bales, silt fence or rock filters are to be installed-at low point of the project during operations if any unstabilized area remains overnight. Unstabilized is defined as an excavated area that has not been filled in with aggregate and/or asphalt material. These measures must be taken so as to receive all runoff from the bare, disturbed area.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7136-02 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Roadway Pavement Widening with Concrete	None Established

Assembly Description Summary

This assembly includes all actions related to the widening of paved roadways such as scarifying, shaping, and/or removing existing material and, the addition of Cement Concrete.

The areas to be widened shall be confined to C, D & E system roadways, shall be programmed on the M-213 program, and shall be approved by the District Executive.

The widening shall consist of a minimum of 2 feet. If both sides of the roadway are to be widened, it shall consist of a minimum of 2 feet on each side.

Refer to Maintenance Manual, Chapter 7, Widening.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

Environmental concerns such as wetlands, erosion control and waterway pollution are to be addressed in the disposal of excavated materials. Refer to Maintenance Manual, Pub. #23, Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
SqYd Code A	None Established	None Established

Method and Procedure:
Varies according to Job Requirements.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The depth of the widened pavement shall match the depth of the existing pavement.

Straw bales, silt fence or rock filters are to be installed-at low point of the project during operations if any unstabilized area remains overnight. Unstabilized is defined as an excavated area that has not been filled in with aggregate and/or asphalt material. These measures must be taken so as to receive all runoff from the bare, disturbed area.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7137-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Roads - Paved Roadway Pavement - Widening Recycled Materials	None Established

Assembly Description Summary

This assembly is all actions related to the widening of paved roadways. This includes scarifying, shaping, and/or removing existing material, sizing of materials, the addition of recycled material blended with liquid bituminous, shaping and compacting. This work shall be in accordance with Publication 23, Publication 27, Publication 242 and be programmed on the M-213 and approved by the ADE-Maintenance.

As part of preparation for this assembly, the RAP material shall be sampled to determine gradation and asphalt content. A mix design shall be developed for liquid bituminous and aggregates, along with application rates, before work begins, as per Publication 27 and approved by the District Materials Engineer/Manager or designee. A compatibility test shall be performed; this is completed by the liquid bituminous vendor. Copies of the liquid bituminous and aggregate compatibility tests as well as the mix designs shall be on site and available for review. Additional aggregate may be required for base course applications. The existing paved roadway width shall be 18 feet or less and the widening shall consist of a minimum of 2 feet. If both sides of the roadway are to be widened, it shall consist of a minimum of 2 feet on each side.

The depth of the widened pavement shall match the existing pavement depth or be a minimum of 6 inches, whichever is less. As much as possible, keep drainage layers consistent with those of the existing pavement.

Waste materials shall not be placed in wetlands or waterways.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Milled Material
6	Equipment Operators	1	Mixer Paver/Pug	Required	(RAP)
As Req.	Equipment Operators (Haul)		Mill		
2	Crew Members	1	Roller (min. 4-6 Ton)		
2	Crew Members	As Req.	Haul Trucks	As	Liquid
	(Safety)	1	Distributor	Required	Bituminous
		1	Excavator/Milling Machine		
		1	Grader		
		1	Widener		
		1	Loader		
		1	Broom		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	None Established	None Established

Method and Procedure:
This varies according to job requirements. Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Material Preparation: This material is produced at the central plant site. The RAP material is fed directly into the crusher/screen then blended with emulsion through a pug mill at the site. Maintain adequate total liquids in the mixture to ensure thorough coating/mixing of the reclaimed material and aggregates with the liquid bituminous material per the mix design. Field adjustments to the moisture or liquid bituminous content may be necessary. Adding water aids in the mixing process, adjust the moisture content first.

Excavation: Remove the existing material to the required depth and width. The depth of the widened pavement shall match the depth of the existing pavement or 6 inches, whichever is less.

Sub-Grade Compaction: Visual observation must be made to ensure there is no movement underneath the roller during compaction. Inspect, re-confine and add aggregate as needed and properly compact.

Cleaning: Properly clean the existing bituminous vertical face.

Hauling: The mixed RAP material is discharged directly into a haul truck, then delivered to the widener for placement. Sufficient material should be delivered to allow for continuous movement of the widener.

Material Placement: Place blended material into the excavated area with a widener in proper lifts according to Publication 242, and compact as per Publication 408. The blended material shall be compacted with a 4-6 ton roller (minimum).

Compaction: Sufficient time should be allowed prior to compaction, to allow for the emulsion to break, allowing as much water as possible to evaporate from the mix. An Electrical Impedance device is used in targeting maximum achievable density. A tandem steel wheel roller in static mode is then used to achieve compaction. Periodic density checks should be performed throughout the project to ensure maximum density is achieved. Back rolling of the previous day's placement may be useful in removing any remaining tire marks and to aid in additional compaction.

Follow Up: Additional rolling and dusting of the surface may be required. The surface must be exposed to1month of warm weather, and should be sealed with a surface treatment or overlay within1year, not to exceed a total of 18 months.

Erosion Sedimentation: Straw bales, silt fence or rock filters shall be installed at the low point of the project during operations, if any unstabilized area remains overnight. Unstabilized is defined as an excavated area that has not been filled in with a blended aggregate/liquid bituminous material. These measures shall be taken so as to receive all run-off from the bare, disturbed area.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 27, Bulletin 27 - Special Bituminous Mixtures (Bulletin 27)
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Project Specific Mix Design (Required On Site)
- Oil – Aggregate Compatibility Test Results (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7141-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads-Rigid Pavement (Concrete) Concrete Patching Full Depth	None Established

Assembly Description Summary
This assembly includes all actions related to the full depth patching/replacement with concrete on rigid pavements.

This assembly includes both Department force and contract work. Partial depth patching (spall repair) using concrete materials shall be charged to 711-7141-02.

The Work Zone Traffic control set up shall be erected in accordance with Pub. #213. This assembly is typically a long-term stationary operation.

A training package including video, slides and work booklet has been prepared for this assembly. All personnel should review training materials prior to start of work.

Refer to Maintenance Manual, Chapter 7, Rigid Pavement Maintenance.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
SqYd Code A	None Established	None Established

Method and Procedure:
Varies According to Job Requirements. Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7141-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads-Rigid Pavement (Concrete) Concrete Patching Partial Depth (Spall Repair)	None Established

Assembly Description Summary
This assembly includes all actions related to the partial depth patching (spall repair) with concrete on rigid pavements.

This assembly includes both Department Force and contract work. Full depth patching using concrete materials shall be charged to 711-7141-01.

The Work Zone Traffic control set up shall be erected in accordance with Pub. #213. This assembly is typically a short-term stationary operation.

A training package including video, slides and work booklet has been prepared for this assembly. All personnel should review training materials prior to start of work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
SqYd Code A	None Established	None Established

Method and Procedure:
Varies according to job requirements.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7147-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Roads-Paved Joint Sealing – Concrete Roads	.02 Lane Mile/Man Hr

Assembly Description Summary

This assembly includes all actions related to joint sealing operations on rigid pavements only. There are 3 types of joint sealing based on service life of the pavement.

Type 1 - a joint rehabiliation policy which involves recutting the joint to meet new specifications as stated in Roadway Construction Standard RC-26. This type of work should be done on pavements having a remaining service life of 10 or more years. In the event joint rehabilitation is not fiscally possible Type 2 resealing shall be performed.

Type 2 - a resealing policy which uses the best material and methods to effectively seal the joints of pavements in average condition. This method should be used on pavements having a remaining service life of 5 to 10 years.

Type 3 - a joint filling policy of minimum cleaning and sealing effort for pavments in poor condition. These pavements will normally be 4R candidates-and have 0 and 5 years remaining service life.

This activity shall only be performed when the temperature is above 40° F and is best performed between 45° F and 55° F. It should be programmed for the spring and fall seasons with major emphasis placed in the months of October and November. It is very important that no sealing be done within 24 hours after any precipitation. Materials will not bond to joint edges when even the slightest moisture is present.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213. This assembly is typically a short-term, slow moving oepration.

Refer to Maintenance Manual, Chapter 7, Crack and Joint Sealing.

A training package including video, slides and work booklet has been prepared for this assembly. All personnel should review training materials prior to start of work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
			TYPE 2		
1	Foreman	1	Crew Cab, Dump Truck		
2	Equipment Operators	1	Double Boiler Kettle	As Req'd	Joint Sealant
5	Crew Members	1	Router and Power		(must meet req.
			Brush or High Pressure		of ASTMD-3405
			Water Blaster & Water		specs.)
1	Equip. Oper. Safety	1	Truck		
1	Crew Members	1	Shadow Vehicle		
1	Foreman		Air Compressor		
1	Equipment Operators	1	Type 3		Joint Sealant
4	Crew Member	1	Crew Cab, Dump Truck	As Req'd	AC
1	Equip. Oper. (Safety)		Double Boiler		(PG 64-22)
1	Crew Members	1	Air Compressor Hand		& Rubber
			Shadow Vehicle		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Lane Miles Code 6	.16 lm/hr.	1 lm/day

Method and Procedure:

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

When using the air compressor to blow out joints, use the auxiliary port located on the side of the compressor. This port is specifically designed to blow air and takes the same couplers as those used to run the hammers. There is no oil tank (used to automatically lubricate the hammer) connected to this port and, hence no oil will enter the line and be blown into the joint.

Type 2 - While the operator is heating the sealant in the double boiler, the remainder of the crew begins cleaning the joints. Three Crew Members using the router or mechanical hook attached to a tractor, power brush and air compressor thoroughly clean all joints.

High pressure water is another approved joint cleaning method. This procedure uses a piece of equipment capable of developing water pressures of 10,000 PSI with a 10 GPM flow rate. These units are available through rental agreements.

A water truck tows the cleaning system and movement is directed by the wand operator. The operator must wear the complete safety package which includes a face shield, heavy duty-rain gear, rubber gloves and steel toe rubber boots. He begins cleaning joints by holding wand at a 45° angle and directs water stream at base of material to be removed. One pass must be made directly on each sidewall to insure a clean face. All joints cleaned by this method must be allowed to dry at least 24 hours before sealing and should be blown out with an air compressor just prior to being sealed.

When the sealant reaches a "Safe Heating Temperature", sealing can begin. "Safe Heating Temperature" can be obtained from the manufacturer's shipping container, and in no case shall the material be applied more than 25° F below the "Safe Heating Temperature" nor shall the material be kept at the "Safe Heating Temperature" for more than 6 hours. Once material reaches application temperature it must be used. Never reheat this type of joint sealing material.

The wand operator walks backward sealing the joint. The wand is kept in the joint and moved at a rate that will keep material 1/8" to 1/4" below the pavement surface. Several passes may be required to fill the joint. If the joint is overfilled, a squeegee must be used to remove excess material from the highway because traffic will pick up this excess removing the material in the joint as well.

During lunch, breaks or delays material must be kept circulating through the wand to prevent any chance of the sealant cooling causing a clog.

At the end of day, flush out all lines in the kettle with an appropriate solvent.

Type 3 - While sealant is being heated in the double boiler or standard kettle, Crew Members using hand hooks pull old loose sealant and debris from the joint. Do not disturb old seals that are performing well. Blow out remaining debris from joint with the air compressor.

Sealant is placed with wand from double boiler. All sealant that was not removed should be capped with new material.

At end of day clean all equipment.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7147-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads-Paved Joint Sealing – Concrete Roads Pavement Shoulder Separation	None Established

Assembly Description Summary
This assembly includes all actions related to sealing the separated area located immediately adjacent to a concrete highway and bituminous shoulder.

The area should be sealed as often as necessary to prevent water from infiltrating the pavement. The importance of keeping the area sealed cannot be overemphasized because most of the water crossing the pavement must flow across this area to reach the ditch line or inlet.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

This assembly is typically a short term, slow moving operation.

A training package including video, slides and work booklet has been prepared for this assembly. All personnel should review training materials prior to start of work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	
1	Equipment Operator	1	Double Boiler		AC-20
2-3	Crew Members	1	Shadow Vehicle		(PG 64-22)
1	(Labor)				& Rubber
	Equipment Oper. (Safety)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Lane Miles Code 6	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

Crew Cab tows the air compressor, a Crew Member, using the wand on the compressor blows out debris from the separated area.

The wand operator walks backward sealing the separated area being certain to entirely fill the separated area.

At end of day clean all equipment.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7148-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roads-Paved Stockpile Aggregate Mechanized	None Established

Assembly Description Summary

This assembly includes all actions related to the stockpiling of aggregate that cannot be identified to a specific cost function. When an aggregate is to be used for a specific assembly that assembly is to be charged.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7151-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Roads-Paved Minor Risk Management/Safety Improvement Projects Manual/Mechanized	None Established

Assembly Description Summary

This assembly includes all actions related to completion of Minor Risk Management/Safety Improvement projects coordinated through the District Traffic Unit or the District Tort Risk Manager.

Elements of this operation include designated, site specific activities such as brushing, bank cutting/shaping, radius improvement, installation of left turning lanes, etc., as assigned by the appropriate authority.

Environmental concerns such as wetland preservation, erosion control measures, waterway pollution prevention must be considered in the execution of this assembly. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7212-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Unpaved Grading Mechanized	.09 Miles/Man Hr.

Assembly Description Summary

This assembly includes all actions related to grading operations, such as grading, shaping, and compacting long sections of unpaved shoulder and side approaches.

This assembly is one of our most important preventive maintenance functions. Properly sloped and maintained shoulders aid in the quick removal of surface water from the roadway into the drainage system.

Shoulder grading can be scheduled throughout the year with the best times being spring and fall. The rainfall in these seasons provides a sufficient amount of moisture to keep the surface in a workable condition.

Shoulders should be graded to provide a minimum slope of 3/4 inch per foot of width.

Incidental material may be added or removed. If the ditch line is simultaneously improved while grading shoulders with no additional efforts, charge all work to this assembly and not assembly 711-7215 SHOULDER CUTTING. If additional passes are made to shape ditch line then the additional time spent should be charged to 711-7215.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213. This assembly is typically a short term, slow moving operation.

Environmental concerns such as wetland preservation, erosion control measures, waterway pollution prevention must be considered in the execution of this activity. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	2RC Aggregate
3	Equipment operator	1	Grader		
1	Crew Member	1	Roller		
1	Equip. Oper. (Haul)	1	Pull Broom		
1	Crew Member (Safety)	1	Dump Truck		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Mile Code 8	.70 Miles/Hr.	5 Miles/Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

The area to be graded should be walked before grading to remove glass and other sharp objects that may puncture a tire.

The lead grader cuts-excess shoulder materials and deposits onto roadway. The second grader redeposit material onto shoulder pushing material ahead into low spots and establishing the finished grade of 3/4" to 1-1/2'. A pull broom follows second grader sweeping the roadway and depositing fine material onto shoulder prior to rolling.

Crew members follow sweeping operation to make required hand repairs to the reworked shoulder surface and to remove excess material obstructing drainage facilities.

The entire reworked shoulder area is thoroughly compacted prior to completing the days' activities.

If the cut shoulder/ditch line outlets into a perennial stream (flowing water) within fifty (50) feet of the roadway, erosion control measures must be incorporated into the project. Straw bales, silt fence or rock filters must be located such that runoff from the disturbed areas is intercepted prior to discharge.

Clean ditch or drainage channel with excavator taking care to cut ditch/channel to original contour by removing only debris or deposited material. Temporary erosion control measures are required if the disturbed area is within 50 feet of a stream. Charge assembly 711-7312 for all time spent cleaning ditches/channels.

Erosion controls such as straw bales, silt fence or rock filters are required at the point of discharge until the ditch line revegetates and the area becomes stabilized. Rock filters may be installed as a more permanent control measure at outlet ditches.

The excavation of embankment slopes in conjunction with ditch cleaning will require that at a minimum the vertical face of the embankment be seeded and mulched in accordance with assembly 714-7716.

Excavated material is to be properly disposed in a non-wetland area and is not to be broadcast onto the slopes of ditches or drainage channels.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7213-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Unpaved Stabilization - Add Material Aggregate/Milled Material (RAP) Mechanized	.03 Mile/Man Hour

Assembly Description Summary
This assembly is all actions related to the adjustment of the shoulder elevation to meet the edge of the existing pavement edge. This includes the mechanized placement, shaping and compaction of stabilizing material (shoulder backup) adjacent to the existing pavement.

When Milled Material (RAP) is used, sealing is required as per Publication 23 and is incidental to this assembly.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Coarse
5	Equipment Operators	1	Widener	Required	Aggregate or
1-2	Crew Members	1	Roller		Milled Material
As Req.	Equipment Operators (Haul)	1	Grader (optional)		(RAP)
2	Crew Members (Safety)	As Req.	Haul Trucks	As	Liquid
		1	Distributor	Required	Bituminous
		1	Broom		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Mile	.40 Mile/Hour	2.5 Miles/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Placement: Trucks deposit the material into the widener for placement onto the shoulder area to the desired width and grade.

Shaping: The widener shapes and sets the slope of the shoulder. If needed, a grader may be used to perform minor shaping to meet field conditions. The finished shoulder cross slope shall be maintained between 3/4 inch to 1 1/2 inch per foot of width.

Handwork: Excess material shall be removed, special attention shall be given to keep drainage facilities functioning.

Sweeping: Sweep the roadway clean, taking care not to disturb the compacted aggregate along the pavement edge.

Compaction: The shoulder shall be thoroughly compacted. Visual observation must be made to ensure there is no movement underneath the roller during compaction.

Aggregate Sealing: Calcium chloride may be added to coarse aggregate (2A or 2RC) only, to improve stabilizing in either of the following ways:

A. Pre-mixed with aggregate (7 Lbs./Ton 8.2% moisture)
B. Applied after compaction in liquid form (.04 Gals./Sq.Yd.)
C. After compaction, apply flake calcium (2 Lbs./Sq.Yds.) and wet with water

Aggregate/RAP Sealing: Distributor applies a prime coat (AEP) to the completed shoulder area at a rate determined by the material used. The shoulder shall be sealed within the same construction season and charged to this assembly.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Pub 546 Threatened and Endangered Species Desk Reference
- Strike Off Letter (SOL) 495-15-07
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7213-09
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Unpaved Stabilization Stockpiling Cost Only	None Established

Assembly Description Summary
This assembly includes all actions related to stockpiling (hauling) of aggregates for shoulder stabilization prior to actually performing the work when the location of the work is not known. Under no circumstances shall site preparation, hauling aggregates to the widener and/or grader, finishing work, etc. be charged to this Method 09 code. When the operation begins Method 01 shall be charged.

Production is always reported as zero (0) miles. An SR, segment and/or offset is not required when reporting this Method.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7214-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Unpaved Dust–Palliative-Bituminous/Calcium Chloride or Other Mechanized	500 Sq. Yds./Man Hour

Assembly Description Summary

This assembly is the application of a dust palliative applied to a stabilized or earth shoulder. This includes the application of a liquid bituminous, calcium chloride or other dust palliative and aggregate on the surface of a properly graded, stabilized or earth shoulder to increase stability.

The preparation of the shoulder, prior to the application of material, should be charged to 711-7212 Grading, 711-7213 Stabilization or 711-7215 Cutting.

This is a planned assembly and should be scheduled for spring.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
			LIQUID BITUMINOUS APPLICATION		
1	Foreman			As Required	Liquid
2	Equipment Operators	1	Crew Cab		Bituminous
1	Crew Member	1	Distributor		
		1	Truck-Spreader		
			CALCIUM-DRY APPLICATION		
1	Foreman			As Required	Dry Calcium
2-3	Equipment Operators	1	Crew Cab		Chloride
1	Crew Member	1	Truck-Spreader		
		1	Loader		
		1	Water Truck		
1	Foreman		CALCIUM-LIQUID APPLICATION		
1	Equipment Operator			As Required	Liquid Calcium
1	Crew Member	1	Crew Cab		Chloride
		1	Distributor (Chemical)		
				As Required	Aggregate

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sq.Yd.	2250 Sq.Yds./Hour	15,000 Sq.Yds./Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Preparation: The shoulder shall be shaped and compacted with a slope of 3/4 inch to 1 1/2 inch per foot of width. All loose rocks and clumps of sod should be removed before material application.

Frequency: One application of liquid bituminous or calcium chloride material per year should be sufficient for shoulders.

For Bituminous Application

Preparation: The oil tanker should be at or near the work area so the distributor operator can fill their machine with little or no travel. The operator also sets the spray bar to the width directed by the Foreman.

Rate: The rate of application of liquid bituminous material is between 0.25 and 0.30 Gals./Sq.Yd.

Placement: Liquid bituminous material is applied with a distributor at the correct width, height and application rate.

Finishing: The distributor is followed by the truck equipped with a spreader. A thin layer of aggregate or other material is applied only at mailbox approaches, driveways and approximately 100 feet on each side of intersections with hard surfaced roads.

For Liquid Calcium Chloride Application

Preparation: Set the tailgate spreader to the required width. If more moisture is needed, prior to application of dry calcium chloride, a water truck should apply water at a rate of 0.5 Gals./Sq.Yd.

Rate: Dry calcium chloride is applied at the rate of 1.2 Lbs./Sq.Yd.

Placement: Apply dry calcium chloride with tailgate spreader to required width and application rate.

For Calcium Chloride Application

Preparation: Set distributor to required width.

Rate: Liquid calcium chloride is applied at the rate of 0.40 Gals./Sq.Yd.

Placement: Liquid calcium chloride is applied with a chemical distributor at the correct width, height and application rate.

For Other Dust Palliatives

Refer to Manufacturer's Specifications for proper application rates and techniques.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Pub 546 Threatened and Endangered Species Desk Reference
- Temperature Gauge
- Yield Testing Results to include Daily Production Reports
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7215-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Unpaved Belt Loader Mechanized Cutting	.05 Shoulder Miles/Man Hr

Assembly Description Summary

This assembly includes all actions related to shoulder cutting operations, such as grading, shaping, adding material, compacting, and hauling away excess material from earth shoulders and areas adjacent to paved shoulders using a belt loader to load excavated materials into haul trucks.

Shoulders should be cut to a slope of 3/4 inch to 1-1/2 inch per foot of shoulder width and verified by the foreman or crew member using slope board or some type of leveling mechanism. Reference the Work Scheduling Calendar – Figure 3-2 in Pub. 23, to view when shoulder cutting should be performed.

Side dozing shall be scheduled, if warranted, in conjunction with this operation and charged to Side Dozing – Mechanical (711-7331-01).

Drainage cleaning done with the grader, such as improving the flow line or cleaning "V" ditches shall be charged to 711-7312-01.

Environmental concerns such as wetlands, erosion control, water way pollution are to be addressed in the performance of this operation and in the disposal of waste materials. Refer to the Maintenance Field Reference for Erosion and Sedimentation Controls, Pub. 464.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Threatened and Endangered Species Desk Reference (Pub 546), for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands, waterways, and flood plains. Waste materials must be stabilized. The Authorization to Enter and Deposit Material form, M-666, requires the property owner to follow proper erosion and sedimentation control measures.

The work zone traffic control set up shall be erected in accordance with Publication 213. This assembly is typically a mobile operation. To avoid traffic control problems, the grader, loader, haul truck, broom, and roller should stay as close together as possible and move as a unit.

A training package has been prepared for this assembly. All personnel should review training materials prior to start of work. At a minimum, the Assistant Highway Maintenance Manager in charge the operation, foreman and core equipment operators shall complete the course prior to performing this operation.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Suitable
4	Equipment Operators	1	Grader	Required	material to fill
2	Crew Members	1	Belt Loader		in low spots
	(Spotter, Handwork)	1	Broom		
3	Equipment Opers.	1	Roller		
	(Haul)	3	Dump Trucks		
3	Crew Members	1	Belt Truck		
	(Safety)v				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Mile Code 8	0.62 Mi./Hr.	4.0 Miles/Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the appropriate required safety talk, review Job Safety Analysis Guide, Pub. 517, and provide general instructions to the work crew on the days' assemblies. Adherence to the Department's Safety Policy Manual, Pub. 445 is mandatory.

Arrangements for the disposal of waste material should be made in advance of the operation. Under no circumstances shall material be disposed in a wetland, water way or flood plain or be disposed on private property in such a manner that the material could be graded into any of these areas. The Authorization To Enter And Deposit Material form, M-666 and the Environmental Due Diligence form, D-1, shall be properly completed prior to the disposition of material onto private property. These forms need to be on site.

The foreman should provide guidance to the grader operator in advance of encountering areas which require special attention such as drop offs, driveways, utilities, drainage structures, etc.

ADD MATERIAL: It is required that a belt truck (or equivalent) be used in front of the grader to place suitable material into drop off area's and compacted prior to the completion of the grading/cutting of the shoulder.

GRADING: If multiple areas are to be filled in, they should be charged to Stabilization – Add Material – Manual (711-7217-01). When multiple areas are only graded then the appropriate assembly, Grading – Mechanical, (711-7212-01) shall be charged.

SPOTTER: A person should be in front of the operation removing debris, such as litter, and marking hazards and communicating them to the grader operator.

CUT SHOULDER: The grader proceeds by cutting excess shoulder material and placing cut material in a windrow on the pavement. The slope of the cut shoulder shall be uniform and be between 3/4" to 1-1/2" per foot of shoulder width. Do NOT unnecessarily cut vegetation if the shoulder cross slope is already properly sloped. Flow lines shall be established to drainage facilities. This may require backing and extra cutting by the grader around drainage facilities.

The longitudinal grade shall be uniform with no depressions which could trap or pond water. The width of the cut in "cut" sections shall be to the toe of the existing slope. Do NOT unnecessarily cut into the slope toe as this enhances erosion. The width of the cut in a "fill" section should be to the edge of the fill where possible, or to the front face of guiderail. Cut material is not to be broadcast onto the slopes in fill areas.

HANDWORK: Large stones and other debris which have been graded onto the pavement must be removed to prevent damage to the belt loader. This person should also remove loose material from drainage facilities. This material should be deposited into the windrow on the roadway. Bleeders are to be cut at 30' intervals under the guiderail at this time.

LOADING: The belt loader immediately follows the grader to remove windrowed material and deposit it into the dump truck.

SWEEPING: The broom follows the loading operation and sweeps material back onto the shoulder prior to compacting with the roller. Care must be taken so as not to erode the shoulder. Multiple passes with the broom may be necessary to ensure the roadway is clean. Hard packed material must be removed from the roadway.

ROLLING/EROSION AND SEDIMENTATION COTROLS: Entire disturbed area shall be rolled in conjunction with the cutting operation. Temporary erosion control measures are required if the disturbed area is within 50 feet of a stream. Erosion controls such as straw bales, silt fence or rock filters are required at the point of discharge until the ditch line re-vegetates and the area becomes stabilized. Rock filters may be installed as a more permanent control measure at outlet ditches.

References and essential items for this assembly

References:	**Essential Items :**
Pub 23 Maintenance Manual	First Aid Kit
Pub 213 Work Zone Traffic Control	Cold Water
Pub 235 Equipment Operator Instructor Manual	Emergency Spill Kits
Pub 408 Highway Construction Specifications	
Pub 445 Safety Policy Manual	
Pub 464 Maintenance Field Reference	
Pub 517 Job Safety Analysis	
Pub 546 Threatened and Endangered Species Desk Reference	
M-666 Authorization To Enter And Deposit Material Form	

Note: Environmental concerns shall be considered, verify with the district environmental unit in the planning process.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7215-02 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Unpaved Front End Loader Mechanized Cutting	.03 Shoulder Miles/Man Hr

Assembly Description Summary

This assembly includes all actions related to cutting operations, such as grading, shaping, adding material, compacting, and hauling away excess material from earth shoulders and areas adjacent to paved shoulders using a belt loader to load excavated materials into haul trucks.

Shoulders should be cut to a slope of 3/4" to 1-1/2" per foot of shoulder width and verified by the foreman or crew member using slope board or some type of leveling mechanism. Reference the Work Scheduling Calendar – Figure 3-2 in Pub. 23, to view when shoulder cutting should be performed.

Side dozing shall be scheduled, if warranted, in conjunction with this operation and charged to Side Dozing – Mechanical (711-7331-01).

Drainage cleaning done with the grader, such as improving the flow line or cleaning "V" ditches shall be charged to 711-7312-01.

Environmental concerns such as wetlands, erosion control, water way pollution are to be addressed in the performance of this operation and in the disposal of waste materials. Refer to the Maintenance Field Reference for Erosion and Sedimentation Controls, Pub. 464.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Threatened and Endangered Species Desk Reference (Pub 546), for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands, waterways, and flood plains. Waste materials must be stabilized. The Authorization to Enter and Deposit Material form, M-666, requires the property owner to follow proper erosion and sedimentation control measures.

The work zone traffic control set up shall be erected in accordance with Publication 213. This assembly is typically a mobile operation. To avoid traffic control problems, the grader, loader, haul truck, broom, and roller should stay as close together as possible and move as a unit.

A training package has been prepared for this assembly. All personnel should review training materials prior to start of work. At a minimum, the Assistant Highway Maintenance Manager in charge the operation, foreman and core equipment operators shall complete the course prior to performing this operation.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Suitable
4	Equipment Operators	1	Grader	Required	material to fill
2	Crew Members	1	Front End Loader		in low spots
	(Spotter, Handwork)	1	Broom		
3	Equipment Opers.	1	Roller		
	(Haul)	3	Dump Trucks		
3	Crew Members	1	Belt Truck		
	(Safety)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Mile Code 8	0.28 Mi./Hr.	2 Miles/Day

Method and Procedure:
Prior to the beginning of work, the foreman shall give the appropriate required safety talk, review Job Safety Analysis Guide, Pub. 517, and provide general instructions to the work crew on the days' assemblies. Adherence to the Department's – Safety Policy Manual, Pub. 445 is mandatory.

Arrangements for the disposal of waste material should be made in advance of the operation. Under no circumstances shall material be disposed in a wetland, water way or flood plain or be disposed on private property in such a manner that the material could be graded into any of these areas. The Authorization To Enter And Deposit Material form, M-666 and the Environmental Due Diligence form, D-1, shall be properly completed prior to the disposition of material onto private property. These forms need to be on site.

The foreman should provide guidance to the grader operator in advance of encountering areas which require special attention such as drop offs, driveways, utilities, drainage structures, etc.

ADD MATERIAL
It is required that a belt truck (or equivalent) be used in front of the grader to place suitable material into drop off area's and compacted prior to the completion of the grading/cutting of the shoulder.

GRADING
If multiple areas are to be filled in, they should be charged to Stabilization – Add Material – Manual (711-7217-01). When multiple areas are only graded then the appropriate assembly, Grading – Mechanical, (711-7212-01) shall be charged.

SPOTTER
A person should be in front of the operation removing debris, such as litter, and marking hazards and communicating them to the grader operator.

CUT SHOULDER
The grader proceeds by cutting excess shoulder material and placing cut material in a windrow on the pavement. The slope of the cut shoulder shall be uniform and be between 3/4" to 1-1/2" per foot of shoulder width. Do NOT unnecessarily cut vegetation if the shoulder cross slope is already properly sloped. Flow lines shall be established to drainage facilities. This may require backing and extra cutting by the grader around drainage facilities.

The longitudinal grade shall be uniform with no depressions which could trap or pond water. The width of the cut in "cut" sections shall be to the toe of the existing slope. Do NOT unnecessarily cut into the slope toe as this enhances erosion. The width of the cut in a "fill" section should be to the edge of the fill where possible, or to the front face of guiderail. Cut material is not to be broadcast onto the slopes in fill areas.

HANDWORK
Large stones and other debris which have been graded onto the pavement must be removed to prevent damage to the belt loader. This person should also remove loose material from drainage facilities. This material should be deposited into the windrow on the roadway. Bleeders are to be cut at 30’ intervals under the guiderail at this time.

LOADING
The front end loader immediately follows the grader to remove windrowed material and deposit it into the dump truck. Large stones and other debris which have been graded onto the pavement must be removed with care to prevent damage to the truck.

SWEEPING
The broom follows the loading operation and sweeps material back onto the shoulder prior to compacting with the roller. Care must be taken so as not to erode the shoulder. Multiple passes with the broom may be necessary to ensure the roadway is clean. Hard packed material must be removed from the roadway.

ROLLING/EROSION AND SEDIMENTATION COTROLS
Entire disturbed area shall be rolled in conjunction with the cutting operation. Temporary erosion control measures are required if the disturbed area is within 50 feet of a stream. Erosion controls such as straw bales, silt fence or rock filters are required at the point of discharge until the ditch line re-vegetates and the area becomes stabilized. Rock filters may be installed as a more permanent control measure at outlet ditches.

References:	**Essential Items :**
Pub 23 Maintenance Manual	First Aid Kit
Pub 213 Work Zone Traffic Control	Cold Water
Pub 235 Equipment Operator Instructor Manual	Emergency Spill Kits
Pub 408 Highway Construction Specifications	
Pub 445 Safety Policy Manual	
Pub 464 Maintenance Field Reference	
Pub 517 Job Safety Analysis	
Pub 546 Threatened and Endangered Species Desk Reference	
M-666 Authorization To Enter And Deposit Material form	

Note: Environmental concerns shall be considered, verify with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7216-01 **EFFECTIVE DATE** July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Unpaved Upgrading Mechanized	None Established

Assembly Description Summary

This assembly is the upgrading of short sections of unpaved shoulders to paved shoulders. This includes scarifying, milling, removing existing material as well as the addition, shaping and compaction of new material. This action is intended to reduce or eliminate erosion caused by high water velocities on unpaved surfaces.

The upgrading of shoulders shall be confined to areas where shoulder erosion problems exist and shall be limited to 500 continuous linear feet per site, unless otherwise approved by the ADE-Maintenance. They shall consist of types 3, 4, 6 and 7 shoulders, constructed on a properly prepared surface as per Publication 72 (RC-25) and Publication 408.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab	As Needed	Bituminous
4	Operators	1	Excavator or		Material
As Req.	Equipment Operators (Haul)		Milling Head		
2 – 3	Crew Members	1	Grader		
2	Crew Members (Safety)	1	Broom	As Needed	Aggregate
		1	Widener		
		1	Roller/Trench		
		1	TACK Applicator	As Needed	TACK
		1	Roller (min. 4-6 Ton)		
		As Req.	Haul Trucks		
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The areas to be upgraded shall be marked out prior to the start of this assembly and shall not delay the day's operation.

Excavation: The existing shoulder material shall be removed to the required width and depth. The depth of excavation shall not exceed the depth of the existing pavement. The addition of coarse aggregate is required where the excavation extends beyond the depth of existing pavement. In cut sections, the repaired area should sufficiently cover the flow line to prevent water from undercutting the toe of the embankment. Excavated material is to be properly disposed of in a non-wetland area and is not to be broadcast onto the slopes of ditches or drainage channels.

Compaction: The excavated area shall be thoroughly compacted, prior to the placement of any material. Visual observation must be made to ensure there is no movement underneath the roller during compaction.

Tack: All vertical bituminous faces shall be properly cleaned and TACK applied.

Placement: Base material is placed into the compacted area using a widener. The material is to be placed in proper lifts and thoroughly compacted with a roller. A consistent shoulder slope of 3/4 inch - 1 1/2 inch per foot shall be maintained.

Sealing: All longitudinal joints shall be properly sealed and charged to this assembly. A skin patch/surface seal should be completed the same construction season and charged to the appropriate assembly.

Follow up: The excavation of embankment slopes in conjunction with shoulder upgrade will require temporary erosion control measures. Rock filters may be installed as a more permanent control measure at outlet ditches. Reference Publication 464 for additional information.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Pub 546 Threatened and Endangered Species Desk Reference
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- M666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (Required on Site)
- Form D-1 Environmental Due Diligence (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7217-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Unpaved Stabilization – Add Material Aggregate/Milled Material (RAP) Manual	None Established

Assembly Description Summary

This assembly is all actions related to the repair of washouts or pavement edge drop-offs at the inside of curves, intersections or other locations. This includes the placement, shaping and compaction of stabilizing material adjacent to the roadway over short sections of unpaved shoulders, using manual methods.

Prior to the placement of material all areas shall be reviewed to determine the cause(s) and proper corrective actions. When poor drainage is contributing to the loss of shoulder material, the shoulder grade line shall be re-established.

When Milled Material (RAP) is used, sealing is required as per Publication 23 and is incidental to this assembly.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Aggregate or
3-4	Equipment Operators	1	Roller		Milled Material
2	Crew Members	1	Broom		(RAP)
2	Crew Members	1	Haul Truck		
	(Safety)	1	Grader (Optional)		
		1	Water Truck (Opt.)	As Required	Liquid
		1	Distributor		Bituminous
		1	Belt Attachment		
			Truck (Opt.)	As Required	Calcium
			Hand Tools		Chloride (if needed)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: Shoulder shall be marked for limits and location of all scheduled repairs, prior to the start of this assembly and shall not delay the day's operation.

Placement: Place the required amount of material directly into the low spot, using the tailgate chute/belt unloader where possible. Manually spread and shape as necessary. A grader may be used to facilitate spreading and shaping.

Handwork: Excess material shall be removed, special attention shall be given to keep drainage facilities functioning.

Sweeping: Sweep the roadway clean, taking care not to disturb the compacted aggregate along the pavement edge.

Compaction: The shoulder shall be thoroughly compacted. Visual observation must be made to ensure there is no movement underneath the roller during compaction.

Aggregate Sealing: Calcium chloride may be added to coarse aggregate (2A or 2RC) only, to improve stabilizing in either of the following ways:

A. Pre-mixed with aggregate (7 Lbs./Ton 8.2% moisture)
B. Applied after compaction in liquid form (.04 Gals./Sq.Yd.)
C. After compaction, apply flake calcium (2 Lbs./Sq.Yd.) and wet with water

Aggregate/RAP Sealing: Distributor applies a prime coat (AEP) to the completed shoulder area at a rate determined by the material used. It is recommended that the shoulder should be sealed within the same construction season and charged to this assembly.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Pub 546 Threatened and Endangered Species Desk Reference
- Strike Off Letter (SOL) 495-15-07
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7221-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Paved Manual Patching Standard	.11 Ton/Man Hour

Assembly Description Summary

This assembly is the repair of deteriorated paved shoulder areas. This includes cutting, cleaning, applying TACK and manually placing plant mix or cold bituminous patching material and compaction on paved shoulders. Bituminous patching on concrete shoulders is also included in this assembly.

Cold bituminous patching material does not require TACK.

Pavement saws, milling heads and pavement breakers with compressors are acceptable methods of cutting the paved shoulder.

Before repair work begins, carefully evaluate all surface deficiencies to determine the cause of the failure. Eliminating the cause of the failures (poor drainage, base repair) is the only way to make a permanent repair, refer to Publication 23.

If available, use a bituminous re-heater (Hot Box) when the ambient temperature is less than 50˚ F.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab	.6 Ton per	Bituminous
2	Equipment Operators	1	Haul Truck	hour	Material
2	Crew Members	1	Vibratory Compactor or Roller		
2	Crew Members (Safety)	1	Pavement Breaker and Power Source	As Req.	TACK
		1	Milling Head		
		1	Bituminous Reheater		
			Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	.6 Ton/Hour	4 Tons/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The areas to be repaired shall be marked out prior to the start of this assembly, e.g. white paint, keel, or chalk line. Marking should be of a square/rectangular shape or with a minimum of angular corners, this will aid in compaction and the quality of the patch and shall not delay the day's operation.

Cutting: Crew members cut out the marked area. All cuts are to be made from the inside out. This will make cutting easier and minimize disturbance to the area outside of the cut. All outside edges are to be sharp vertical edges with minimal angular corners.

Cleaning: Remove all loose material and dry the area by means of compressed/forced air or broom.

TACK: Apply TACK to the vertical edges and all remaining bituminous surfaces, making sure uniform film and 100% coverage is attained. Do not allow TACK to puddle.

Material: Upon arrival check the material type and temperature.

Filling: Material shall be placed into the hole to proper depth, distributed, finished with a lute, and the corners properly filled. Place material in uniform lifts and compact, allowing the material to sufficiently cool before applying additional lifts. The final compacted lift shall match the adjacent pavement. Do not exceed the maximum lift size or maximum overall thickness for the material being placed; wearing course material must not exceed 3 inches in total depth. A good rule of thumb is 1 1/4 inch un-compacted = 1 inch compacted. For deeper holes it is recommended to use a binder course, as this material tends to be more stable under loading.

Sweeping: Prior to compacting, remove all loose material from adjacent surfaces which may cause bridging.

Compaction: Thoroughly compact each lift with a vibratory roller or a 4-6 ton static roller, pinching edges first.

Clean Up: Properly clean up the area, leaving no debris or litter.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7221-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Paved Patching Plant Mix Paver or Widener Mechanized	.90 Ton/Man Hour

Assembly Description Summary

This assembly is the mechanized repair of deteriorated paved shoulder areas. This includes cutting, cleaning, applying TACK, and placing plant mix material and compaction on existing paved shoulders. This assembly should be used in conjunction with 711-7122.

This work shall be done in accordance with Publication 408.

Pavement saws, milling heads and pavement breakers with compressors are acceptable methods of cutting the paved shoulder.

Bituminous patching on concrete shoulders is also included in this assembly.

All surface failures must be reviewed carefully, to determine the cause of the failure before repair work is started. Eliminating the cause of the failures (poor drainage, base repair) is the only way to make a permanent repair. Refer to Publication 23.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab	As Required	Bituminous
3	Equipment Operators	1	Paver or Widener		Material
2	Crew Members	1	Vibratory Roller		
3	Equipment Operators (Haul)	1	Water Truck		
1	Equipment Operator (Safety)	1	TACK Applicator	As Required	TACK
1	Crew Member (Safety)	1	Broom		
		3	Haul Trucks		
		1	Milling Head		
		1	Bituminous Reheater		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	11 Tons/Hour	75 Tons/Day

Method and Procedure:

Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the crew on the day's activities.

Marking: The areas to be repaired shall be marked out prior to the start of this assembly. This shall be done in advance of this operation and shall not delay the day's operation.

Milling/Cutting: Remove the existing shoulder material to the required depth.

Sweeping: The roadway shall be swept clear of all debris before the assembly begins.

TACK: Apply TACK to the vertical edges and all remaining bituminous surfaces, making sure uniform film and 100% coverage is attained. Do not allow TACK to puddle.

Application: Have the paver/widener properly adjusted to the correct width and depth before the first loaded truck arrives. When the first loaded truck arrives, check for the proper material type and temperature. Align the paver/widener with the beginning of the area to be patched and start applying the material to the shoulder. The paver/widener moves forward following the pavement edge as a guide. Continuous forward movement while raising the bed of the truck will give the best application. Stop only when the truck is empty or at the end of the patch. Depending on the width being patched, one or two crew members follow the paver to spot fill and cleanup edges when required. Material shall be placed to the proper depth, distributed and finished with lute with corners properly filled. Place material in uniform lifts and compact, allowing the material to sufficiently cool before applying additional lifts. The final compacted lift shall match the adjacent pavement. Do not exceed the maximum lift size or maximum overall thickness for the material being placed; wearing course material must not exceed 3 inches in total depth. A good rule of thumb is 1 1/4 inch un-compacted = 1 inch compacted. For deeper holes, it is recommended to use a binder course, as this material tends to be more stable under loading.

Compaction: Compact patch with vibratory roller(s), pinch roll along the joint first. Roller operators drive the water truck and fill their own roller.

Monitor: Before opening the mat up to traffic, check the temperature to assure it is <140˚ F.

Follow-up: It is recommended that the repaired areas be covered with a mechanized skin patch or surface treatment within the same calendar year. At a minimum, the joint between the patch and existing pavement shall be sealed using approved sealant material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently, then that work is charged to assembly 711-7228-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7222-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Plant Mix Mechanized	None Established

Assembly Description Summary

This assembly is the application of bituminous material to existing paved shoulders. This includes the application of TACK, placing of bituminous material with a paver and compaction on paved shoulders and side approaches in conjunction with a main line paving assembly. Refer to Publication 23.

This assembly shall be programmed on the M-213 and approved by the ADE-Maintenance.

All areas to be repaired are to be reviewed to determine the cause of the problem prior to the placement of material. If the damage is drainage related, inspect and repair as needed.

Surface distresses shall be repaired before the surface is paved and charged to the appropriate assembly.

Paving shall be limited to the time period and temperature restrictions as specified in Publication 408.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Bituminous
3	Equipment Operators	1	Paver		Material
2	Crew Members	1	Vibratory Roller		
As Req.	Equipment Operators (Haul)	1	Water Truck		
2 - 3	Crew Members (Safety)	1	Tack Coat Applicator	As Required	TACK
		1	Broom		
		1	Milling Head		
		As Req.	Haul Trucks		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The limits of work shall be marked on the shoulder. All paving notches to include intersecting roadways shall be cut in accordance to Publication 72, RC-28. This should not delay the paving operation.

Preparation: All surface repairs shall be completed prior to the beginning of this operation, and field verified. These assemblies shall be charged according to the operation performed. A roller pattern shall be developed (an Electrical Impedance device is acceptable), targeting maximum achievable density.

Sweeping: The roadway shall be swept clear of all debris before the assembly begins.

TACK: Apply TACK uniformly with a distributor. Refer to Publication 23.

Placement: When the first loaded truck arrives check for the proper material type and temperature. This operation is a standard paver/finisher application with trucks loaded with material backing into the paver hopper, then being pushed along by the paver as material is applied from the paver to the surface. The truck empties material into the hopper, moves away and is replaced by the next truck. Material is applied at the required thickness according to Publication 242. Do not exceed the maximum lift size or maximum overall thickness for the material being placed; wearing course material must not exceed 3 inches in total depth. The final compacted lift shall match the adjacent pavement.

Finish: Depending on the width being paved, one or two crew members follow the paver to spot fill and cleanup edges where required.

Compaction: Compact shoulder with vibratory roller(s) utilizing the established roller pattern. Roller operator(s) drive the water truck and fill their own roller. Superpave compaction requirements may vary.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge (Required on Site)
- Density Verification Tool (Required on Site)
- Yield Results to include Daily Production Reports
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7224-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Seal Coat Liquid Bituminous Mechanized	56 Gals./Man Hour

Assembly Description Summary

This assembly is the single application of liquid bituminous and aggregate on paved shoulders. This includes all actions related to the application of liquid bituminous material, immediately followed with coarse aggregate.

All surface defects shall be repaired and completed in accordance with Publication 23, prior to this assembly. Shoulder preparatory work such as pothole patching, skin patching, crack sealing, base repair, pipe replacement, etc., shall be charged to the appropriate assembly.

This assembly shall be programmed on the M-213 and approved by the ADE-Maintenance.

This standard is based on the bituminous tanker being located within two miles of the work job site, preferably near midpoint of the day's work area and the aggregate stockpiled close by. This distance determines number of trucks required for hauling. If the aggregate is hauled directly from the quarry, it may influence the number of trucks required.

At a minimum, the Assistant Manager in charge of seal coat operations, Foreman, and core equipment operators (distributor, chipper, and roller) shall have completed the Surface Improvement Training (SIT) course within the past 2 years.

The Work Zone Traffic Control set up shall be placed in accordance with the current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	750	Liquid
4	Equipment Operators	1	Distributor	Gallons	Bituminous
3	Crew Members	1	Chip Spreader	per hour	
2-3	Equipment Operators (Haul)	1	Pneumatic Tire Roller		
2	Crew Members (Safety)	1	Broom	As	Aggregate
		2-3	Haul Trucks	Required	#8 - 1.0% LBW
		1	Loader		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	750 Gals./Hour	5000 Gals./Day

Method and Procedure:

Prior to the beginning of the work, the Foreman shall give the required safety talk and provide general instruction to the crew on the day's activities, to include targeted application rates. The shoulder shall be swept clear of all loose debris before the operation begins. Preparatory work, such as potholes and severe depressions, shall be repaired prior to assembly and charged accordingly.

Equipment Verification: The Distributor, Chip Spreader and Pneumatic Tire Roller shall be verified as outlined in Publication 23. Additionally, design application rates for liquid bituminous and aggregates shall be developed by the county, and approved by the District Materials Manager or designee, as outlined in Publication 27 (Bulletin 27) or equivalent before work begins. Copies of these documents shall be on site and available for review.

Distributors: The operator transfers a load of liquid bituminous material from the tanker, verifying the material type and temperature of each load. The operator then moves to the starting point for the day's work, setting the spray bar to the correct height and width to include "End Nozzles" for the edge line. The distributor operator verifies that there is a uniform spray pattern and application rates for liquid bituminous material. The application rate shall +/-10% of the design rate or field adjusted rate and documented by the Foreman on the payroll.

Chip Spreader: The operator moves the chipper into position setting the application rate and width to cover liquid bituminous area with aggregate. The operator and one or two crew members operate the chip spreader and verify the application rate for the aggregate. The application rate for the aggregate shall be within 20% of the design rate or field adjusted rate and documented by the Foreman on the payroll. A minimum of two Aggregate Yield Tests shall be performed each day, documenting date and location of the test, and be available for review on site.

Haul Trucks: A loaded truck is positioned and hooked to the chip spreader; care must be exercised to not spill excess aggregate onto the roadway. Cycling trucks in and out of the chip spreader will ensure an efficient operation.

Rollers: Immediately follow with a Pneumatic Tire Roller to seat the aggregate. The Pneumatic Tire Roller ground contact pressure shall be 40 to 50 PSI.

Sweeping: The entire shoulder shall be swept clear of excess aggregate within 24 hours or sooner of the operation and shall be verified. The sweeping of the shoulder the day of and any day after, is incidental to the operation and shall be charged to this assembly.

Mat Protection: Control of traffic through the work area is most important to achieve a high quality project. Keep traffic off the fresh mat, until an adequate cure has occurred. A pilot vehicle should be used to control both traffic and speed throughout the recently completed project.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 27 Bulletin 27 Specifications-Special Bituminous Mixtures
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- Oil – Aggregate Compatibility Test Results (Required on Site)
- Equipment Verification Forms M-214A through 214F and Project Specific Designs (Required on Site)
- Yield Testing Equipment and Results to include Daily Production Reports (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7224-09
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Paved Seal Coat Stockpiling Material Only	None Established

Assembly Description Summary

This assembly shall only apply to the end of the surface treatment/seal coat operations where excess aggregate is stored for future use.

Production is **always** reported as Zero (0) gallons. An SR, segment and/or offset is not required when reporting this assembly.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	None Established	None Established

Method and Procedure:

Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

This varies according to job requirements.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7225-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders Paved or Unpaved Driveway Adjustments Manual/Mechanical	None Established

Assembly Description Summary
This assembly is for the adjustment of either paved or unpaved driveways. This includes all actions related to driveway adjustments.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	None Established	None Established

Method and Procedure:
Conduct field views to determine if any driveway adjustments (preparatory milling) are necessary to maintain pavement depths of the new overlay. This varies according to job requirements.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7226-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Paved Base/Sub-base Repair Light Duty	1.04 Tons/Man Hour

Assembly Description Summary

This assembly is the repair to the base/sub-base on light duty shoulders. This includes the repair and removal of base/sub-base material to include pavement surface, placing sub-grade drains, bleeders, adding new material and compaction. A light duty shoulder is defined as a shoulder with less than 2 inches total depth of bituminous surface including surface treatment build up.

The prime cause of base failures is a lack of proper drainage. Major alligator and/or deflection cracking are good indications of base failure.

The majority of base failures will occur in the spring, or during extreme wet weather.

If large areas are being repaired or scarifying is necessary, a grader and an operator should be added to the assembly recommendations listed below.

Waste materials must be stabilized. Rolling is an acceptable stabilization method.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes but is not limited to WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab	10 Tons/hr.	Aggregate
2	Equipment Operators	1	Excavator		
2	Crew Members	2	Haul Trucks	As required	Bituminous
2	Equipment Operators (Haul)	1	Roller (min, 4-6 Ton)		Material
2	Crew Members (Safety)	1	Loader		
		1	Pavement Saw	As required	Calcium Chloride (if needed)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	10 Tons/Hour	70 Tons/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Removal: Saw cut the marked areas. Using an excavator, remove all base and/or sub-base material that has failed.

Filling: Crew replaces excavated material with proper aggregate. Aggregate is placed in no more than 4 inch lifts and compacted. Visual observation must be made to ensure there is no movement underneath the compaction device. Build base to the bottom of existing bituminous surface and place surface course to match existing shoulder.

Additive: Calcium chloride may be added to the aggregate to improve stability. It can be added in the following ways:

A. Pre-mixed with aggregate (7 Lbs./Ton 8.2% moisture)
B. Applied after compaction in liquid form (.04 Gals./Sq.Yd.)
C. After compaction, apply flake calcium (2 Lbs./Sq.Yd.) and wet with water

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (Required on Site)
- Form D-1 Environmental Due Diligence (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7226-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Base/Sub-base Repair Heavy Duty	.83 Ton/Man Hour

Assembly Description Summary

This assembly is the repair to the base/sub-base on heavy duty shoulders. This includes removal of surface and base/sub-base material, placing drains and sub-grade drains, new material, and compaction on flexible base shoulders.

Before repair work begins, carefully evaluate all surface deficiencies to determine the cause of the failure. Eliminating the cause of the failures (poor drainage, base repair) is the only way to make a permanent repair, refer to Publication 23.

The majority of base failures usually occur in the spring, or during extreme wet weather.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Aggregate
1-2	Equipment Operators	1	Excavator		
2	Crew Members	2	Haul Trucks		
2	Equipment Operators (Haul)	1	Roller (min. 4-6 Ton)		
2	Crew Member (safety)	1	Pavement Breaker/ Pavement Saw	As Required	Bituminous Material
		1	Vibratory Compactor		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	7 Tons/Hour	50 Tons/Day

Method and Procedure:

Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The shoulder shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Cutting: Crew members, using an air hammer with a wide chisel, hydraulic/gas breaker, or pavement saw, cut the edges of the patch vertically.

Excavation & Sub-Base Compaction: Excavator operator removes all base and sub-base material that has failed. Surface, sub-base and sub-grade material must be removed as deep as necessary to reach firm support. In areas where a water problem exists, some measure of drainage must be provided, such as sub-grade drains.

Cleaning and TACK: Clean vertical edges with compressed air or broom. Apply TACK uniformly to all vertical surfaces. Broom and hand brushing are acceptable means of applying TACK.

Filling:

Sub-Grade: Prior to applying TACK, the crew replaces excavated material with #2A aggregate in 6 inch lifts and compacts until there is no visual movement underneath the compactor. The depth of the new sub-base should be equal to or deeper than that of the existing base.

Base: When the first loaded truck arrives, check for the proper material type and temperature. The crew places bituminous material, as per Publication 242. Compact the material until there is no movement underneath the compactor. Care must be taken that lifts do not exceed maximum thicknesses and proper compaction is obtained. (Superpave mix lift requirements may vary with aggregate size.)

Wearing: When the first loaded truck arrives check for the proper material type and temperature. Crew replaces wearing surface to match the existing roadway edge and shoulder grade.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Follow-up: At a minimum the joint between the patch and existing pavement shall be sealed using approved crack sealing material prior to winter. Sealing of the patch is considered incidental to this assembly. If cracks in the adjacent pavement are sealed concurrently then that work is charged to assembly 711-7228-01.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (Required on Site)
- Form D-1 Environmental Due Diligence (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7227-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Skin Patch Liquid Bituminous Manual	5 Gals./Man Hour

Assembly Description Summary
This assembly is the manual application of liquid bituminous and aggregate on paved shoulders in limited areas. This includes sweeping, application of liquid bituminous material and placing and seating the cover aggregate on paved shoulders.

Publication 23 restricts application of liquid bituminous to air temperatures of 60˚F and above. If performing below the policy, refer to Publication 23 for wavier guidance.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENNDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	44 Gals./Hour	Liquid Bituminous
1	Equipment Operator	1	Roller (min. 4-6 Ton)		
3	Crew Members	1	Heating kettle		
1	Equipment Operator (Haul)	1	Haul Truck	As Req'd	Aggregate #1B AASHTO #8
1-2	Crew Members	1	Loader		
	(Safety)		Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	44 Gals./Hours	300 Gals./Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Preparation: Preparatory work, such as surface distresses and severe depressions, shall be repaired prior to this assembly and charged accordingly.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Sweeping: The roadway shall be swept clear of all debris before the assembly begins.

Material: Load the trucks with appropriate aggregate at the stock site and proceed to the job site.

Application: Heat the liquid bituminous to appropriate temperature as per the manufacturer's recommendation. Apply hot liquid bituminous with spray wand over the entire area to be patched. Immediately drop 1B (#8) aggregate onto the liquid bituminous using a flat shovel, and seat with a roller. Seating the aggregate is necessary for a good skin patching operation. Do not fan stone over the liquid bituminous because the aggregate has a tendency to roll, coating the entire stone instead of just the bottom.

Follow-up: Clean up area by sweeping excess loose aggregate. Refer to Publication 23.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7227-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Paved Skin Patch Liquid Bituminous Mechanized	33 Gals./Man Hour

Assembly Description Summary
This assembly is the mechanized application of liquid bituminous and aggregate on paved shoulders in limited areas. This includes sweeping, application of liquid bituminous material and placing and seating the cover aggregate on paved shoulders.

This assembly is done when the areas to be treated are too extensive for manual skin patching, yet the condition of the shoulder does not warrant a complete liquid bituminous seal coat.

Publication 23 restricts application of liquid bituminous to air temperatures of 60˚F and above. If performing below the policy, refer to Publication 23 for waiver guidance.

The Work Zone Traffic Control set up shall be placed in accordance with the current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENNDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab	400 Gal	Liquid Bituminous
4-5	Equipment Operators	1	Distributor	Per Hour	
2	Crew Members	1	Chip Spreader		
1-2	Equipment Operators	1	Roller (min. 4-6 Ton)		
2-3	(Haul) Crew Members	1	Broom	As Req'd	1B Aggregate
	(Safety)	1	Loader		AASHTO #8
		3	Haul Trucks		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	400 Gals./Hour	3000 Gals./Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Preparation: Preparatory work, such as surface distresses and severe depressions, shall be repaired prior to this assembly and charged accordingly.

Marking: Roadway shall be marked for limits and location of all scheduled repairs prior to the start of this assembly and shall not delay the day's operation.

Sweeping: The shoulder shall be swept clear of all debris before the assembly begins.

Equipment Preparation: The distributor operator transfers a load of liquid bituminous from the tank and heats to application temperature per manufacturer's recommendations. The distributor then moves to the starting point for the day's work, setting the height, width, and nozzles of spray bar. The pump pressure is adjusted and the tachometer set to achieve the correct speed and application rate.

Load the trucks with appropriate aggregate at the stock site and proceed to the job site.

The chip spreader is set to the correct width and rate of feed and proceeds to the starting point for the day's assembly.

Spraying: The distributor puts down an application of hot liquid bituminous material according to the Foreman's directions. Application rates routinely vary from 0.25 to 0.40 Gals./Sq.Yds.

Applying: The chip spreader immediately follows the distributor and applies a layer of aggregate at a rate varying between 15–25 Lbs./Sq. Yd.

Rolling: Immediately follow with a roller to seat aggregate into the bituminous.

Clean Up: Additional sweeping may be necessary if there is excess aggregate remaining after rolling.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. Before terminating work each day, replace all lane lines covered or destroyed during the day's operations, with applicable temporary pavement marking patterns. The installation of temporary pavement markings shall be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge
- Oil – Aggregate Compatibility Test Results
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kitss

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7227-09
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Skin Patch Stockpile Costs Only	None Established

Assembly Description Summary
This assembly shall only apply to the end of the seal coat/surface treatment operations where excess aggregate is stored for future use.

Production is **always** reported as Zero (0) gallons. An SR, segment and/or offset is not required when reporting this Method.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallon	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

This varies according to job requirements.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7228-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Crack Sealing – Bituminous Surface Manual	None Established

Assembly Description Summary

This assembly is the sealing of the cracks in bituminous shoulders with pre-packaged material. This includes heating the material, cleaning the cracks, applying material and wiping the material flush. The objective of this operation is to prevent more serious surface distress or base failures. Refer to Publication 23.

The required Liquid Asphalt Safety and Tar Kettle training for this assembly can be found in Publication 235, along with the frequency of the training.

Do not place sealant when the ambient temperature is below 40˚F or above 90˚F, without the approval from the District Executive.

This work is to be included in the M-213 Program and approved by the ADE-Maintenance.

At a minimum, the application operators and the kettle operators, shall have completed the Crack Sealing, Maintenance Activity Training (MAT) course within the past 2 years.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Pre-packaged
1-2	Equipment Operators	1-2	Haul Trucks		Material
3-5	Crew Members	1	Double Boiler Kettle		
2	Crew Members (Safety)	1	Air Compressor		
		1	Squeegee/Equivalent		
		1	Hot Compressed Air Lance (Optional)		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Lane Mile	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the appropriate required safety talk, review Publication 517 and provide general instructions to the work crew on the day's assemblies. It is mandatory to be in compliance with Publication 445. Water shall be on site to cool the hot liquid in the event that sealant material comes in contact with personnel.

Cleaning: The cracks shall be free of all dirt, dust, vegetation and/or foreign materials using consistent compressed air of 100 P.S.I. measured at the source or a hot compressed air lance.

Drying: A hot compressed air lance shall be used to dry all damp cracks. Care must be taken so as to not burn, scorch, or damage the surface when using the hot compressed air lance. It is required that all cracks be dry.

Sealing Equipment: A "double boiler" style kettle with calibrated temperature gauges and full sweep agitator shall be used. Calibration to be done as per manufacturer's recommendation.

Materials: Only pre-packaged materials are accepted for use. It is also important to heat and apply the sealant being used to the manufacturer's specifications both for quality performance and safety concerns. The temperature limits as listed on the outside of the shipping package or Material Data Sheet shall be adhered to at all times.

Sealing: All warranted cracks shall be uniformly filled and sealed. Cracks shall be sealed by placing the applicator wand in or directly over the crack and carefully placing the proper amount of sealant to just fill the crack. In all circumstances the material shall be wiped flush with the pavement surface leaving a thin film of sealant 1/32 inch to 1/16 inch thick and from 1 inch to 3 inches wide. Cracks that vary in width within the prescribed parameters shall be sealed along their entire length. Sealant shall not overlap, run together, or cause a dense amount of sealant to accumulate. Do not place sealant when the air temperature is below 40˚F or above 90˚F. Areas that have multiple cracks or cracks less than 1/4 inch wide should be skin patched.

Traffic Control: All traffic shall be kept off fresh material until it is cured. When necessary, a detack solution can be used to eliminate sealant pick-up and tracking.

Markings and Signage: Temporary pavement markings and signs shall be installed and maintained if existing markings were eradicated by the day's operation and should be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent markings, if required.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 235 Equipment Operator Instructor Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 517 Job Safety Analysis (Required on Site)
- Burn Kit
- Cool Water (Required on Site for burns)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7228-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Crack Sealing – Concrete Surface Manual	None Established

Assembly Description Summary

This assembly is the sealing of the cracks in concrete shoulders with pre-packaged material. This includes cleaning of the cracks and applying material and wiping flush. The objective of this operation is to prevent more serious surface distress or base failures. Refer to Publication 23.

The required Liquid Asphalt Safety and Tar Kettle training for this assembly can be found in Publication 235, along with the frequency of the training.

Do not place sealant when the ambient temperature is below 40˚F or above 90˚F without approval from the District Executive.

This work is to be included in the M-213 Program and approved by the ADE-Maintenance.

At a minimum, the application operators and the kettle operators, shall have completed the Crack Sealing, Maintenance Activity Training (MAT) course within the past 2 years.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Pre-packaged
1-2	Equipment Operators	1-2	Haul Trucks		Material
3-5	Crew Members	1	Double Boiler Kettle		
2	Crew Members	1	Air Compressor		
	(Safety)	1	Squeegee/Equivalent		
		1	Hot Compressed Air Lance (optional)		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Lane Mile	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the appropriate required safety talk, review Publication 517 and provide general instructions to the work crew on the day's assemblies. It is mandatory to be in compliance with Publication 445. Water shall be on site to cool the hot liquid in the event that sealant material comes in contact with personnel.

Cleaning: The cracks shall be free of all dirt, dust, vegetation and/or foreign materials using consistent compressed air of 100 P.S.I. measured at the source or a hot compressed air lance.

Drying: A hot compressed air lance shall be used to dry all damp cracks. Care must be taken so as to not burn, scorch, or damage the surface when using the hot compressed air lance. It is required that all cracks be dry.

Sealing Equipment: A "double boiler" style kettle with calibrated temperature gauges and full sweep agitator shall be used. Calibration to be done as per manufacturer's recommendation.

Materials: Only pre-packaged materials are accepted for use. It is also important to heat and apply the sealant being used to the manufacturer's specifications both for quality performance and safety concerns. The temperature limits as listed on the outside of the shipping package or Material Data Sheet shall be adhered to at all times.

Sealing: All warranted cracks shall be uniformly filled and sealed. Cracks shall be sealed by placing the applicator wand in or directly over the crack and carefully placing the proper amount of sealant to just fill the crack. In all circumstances the material shall be wiped flush with the pavement surface leaving a thin film of sealant 1/32 inch to 1/16 inch thick and from 1 inch to 3 inches wide. Cracks that vary in width within the prescribed parameters shall be sealed along their entire length. Sealant shall not overlap, run together, or cause a dense amount of sealant to accumulate. Do not place sealant when the air temperature is below 40˚F or above 90˚F. Areas that have multiple cracks or cracks less than 1/4 inch wide should be skin patched.

Traffic Control: All traffic shall be kept off fresh material until it is cured. When necessary, a detack solution can be used to eliminate sealant pick-up and tracking.

Markings and Signage: Temporary pavement markings and signs shall be installed and maintained if existing markings were eradicated by the day's operation and should be charged to this assembly. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 235 Equipment Operator Instructor Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 517 Job Safety Analysis (Required on Site)
- Burn Kit
- Cool Water (Required on Site for burns)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7232-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Shoulders - Paved Milling Bituminous Surface Mechanized	None Established

Assembly Description Summary
This assembly is the milling of bituminous shoulders. This includes all actions related to shoulder milling such as removing, loading, hauling and cleanup of RAP material.

Only clean or uncontaminated milled asphalt material is to be used in RAP for paving roadways or shoulders. This material is to be kept clean and stockpiled for proper use. Refer to Publication 23.

Waste materials must be stabilized. Rolling is an acceptable stabilization method.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sq.Yd.	None Established	None Established

Method and Procedure:
Varies according to job requirements.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 242 Pavement Policy Manual
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)

- Pub 546 Threatened and Endangered Species Desk Reference
- Pub 611 Waste Management Guidance Manual
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- D-1 Environmental Due Diligence Form (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7233-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Shoulders - Paved Milling Bituminous Surface Mechanized	None Established

Assembly Description Summary

This assembly shall be performed in conjunction with a recycled bituminous roadway surface improvement. All actions related to cold pavement recycling using a central mixing plant on paved shoulders. This includes all hauling (once project location is determined), sizing of materials, set-up, calibration/verification, handling millings, mixing, hauling, paving, compaction and traffic control.

As part of preparation for this assembly, the RAP material shall be sampled to determine gradation and asphalt content. A mix design shall be developed for liquid bituminous and aggregates, along with application rates, prior to work beginning, as per Publication 27 and approved by the District Materials Engineer/Manager or designee. A compatibility test shall be performed; this is completed by the liquid bituminous vendor. Copies of the liquid bituminous and aggregate compatibility tests as well as the mix designs shall be on site and available for review. Additional aggregate may be required for base course applications.

All preparatory work shall be completed in the construction season prior to the placement of the recycled pavement course and charged appropriately.

Do not place base course from September 1 to April 30 in Districts 1-0, 2-0, 3-0, 4-0, 9-0, and 10-0; and from October 1 to April 30 in all other Districts.

This work shall be programmed on the M-213 and approved by the ADE–Maintenance.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation, performed under a daylight road closure.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	Milled Material
2	TEOS	1	Dozer or Track	Required	(RAP)
8	Crew Members		Excavator		
3	Crew Members (laborer)	1	Large Loader		
		1	Crusher	As	Liquid
			(400 Tons/hour)	Required	Bituminous
		1	Pugmill		
		1	Finish Paver		
		1	Steel Wheel	As	Aggregate
			Vibratory Roller	Required	
		1	Pneumatic Tire Roller		
		3	Haul Trucks		
		1	Broom		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sq.Yd.	None Established	None Established

Method and Procedure:
The Foreman shall ensure that enough trucks for hauling from the pugmill to the paver are available to permit continual operation based on haul distance, mat thickness and paver speed. Prior to the beginning of each work day, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Material Preparation: At the stock site, the material shall be properly sized to the design specifications, for the application being used. Operators will feed the material through a crusher/screen to size the material just prior to it being loaded in the pug mill for blending with liquid bituminous.

Sweeping: The roadway shall be swept clear of all debris before the assembly begins.

TACK: TACK is not required for cold recycled pavement courses applied on existing bituminous surfaces.

Mixing/Blending: This material is produced at the central plant site. The properly sized RAP material is fed directly into the pug mill and blended with emulsion at the site. Maintain adequate total liquids in the mixture to ensure thorough coating/mixing of the reclaimed material and aggregates with the liquid bituminous material per the mix design. Field adjustments to the moisture or liquid bituminous content may be necessary. Adding water to the mix aids in the mixing process, adjust the moisture content first.

Hauling: The mixed RAP material is loaded into a haul truck, and then delivered to the paver for placement. Sufficient material should be delivered to allow for continuous movement of the paver.

Material Placement: The paver places the material on a properly prepared shoulder surface, preferably in one single pass. The profile and cross section should be controlled to correct irregularities in the existing shoulder surface, as well as maintaining the desired yield. Crew members shall correct any deficiencies in the mat such as holes, uneven edges, drag marks, etc., using hand tools. Provide transitions at driveways and intersections as required. Paver speed should be controlled to match the flow of material to the paver. Stopping of the paver will result in the screed settling in the fresh mat.

Compaction: Sufficient time should be allowed for the emulsion to break, allowing as much water as possible to evaporate from the mix, prior to compaction. A roller pattern shall be developed (an

Electrical Impedance device is acceptable), targeting maximum achievable density. A tandem steel wheel vibratory roller is used as the breakdown roller, followed by a Pneumatic Tire Roller. A tandem steel wheel roller in static mode is then used as a finish roller. Variations on this are acceptable as long as maximum density is achieved by the roller pattern document. Periodic density checks should be performed throughout the project to ensure maximum density is achieved. If the results of these density checks indicate a change, or some other factor changes, a new roller pattern should be developed. Back rolling of the previous day's placement may be useful in removing any remaining tire marks and to aid in additional compaction.

Follow-Up Activities: The completed shoulder must be exposed to1month of warm weather, and should be sealed with a surface treatment or overlay within1year, not to exceed 18 months.

Markings and Signage: When required, all advance signing (prior to project start) and post project signing requirements, must be in place and maintained in accordance with Publication 213. After completion of the required work, contact the Assistant Manager to coordinate and schedule replacement of the permanent pavement markings.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 27, Bulletin 27
- Pub 213 Work Zone Traffic Control (Required On Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required On Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required On Site)
- Temperature Gauge (Required On Site)
- Project Specific Mix Design (Required On Site)
- Roller Pattern Document (Required On Site)
- Oil – Aggregate Compatibility Test Results (Required on Site)
- Cold Water (Required On Site)
- First Aid Kit (Required On Site)
- Emergency Spill Kits (Required On Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7311-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage Cleaning Inlets and Endwalls Manual and Mechanized	.75 Each/Man Hour

Assembly Description Summary

This assembly is the routine cleaning of inlets and endwalls. This includes cleaning inlets, endwalls, removal and disposal of material. This also includes all cleaning operations performed in the ditch channel within 15 feet of the pipe opening and one shovel length into the pipe. When cleaning ditches and drainage channels charge 711-7312-01.

The standard on this assembly is based on routine maintenance (minor debris removal). Inlets and endwalls needing major cleaning should be charged to 711-7311-02.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a mobile operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
			MANUAL		
1	Foreman	1	Crew Cab		No materials
1	Equipment Operator	1	Haul Truck		required
2	Crew Members (Labor)		Hand Tools		
1	Crew Members (Safety)				
			MECHANIZED		
1	Foreman	1	Crew Cab		
1	Equipment Operator	1	Vactor or		No materials
1	Equipment Operator (Haul)	1	Haul Truck		required
1	Crew Member (Labor)		Excavator		
1	Crew Member (Safety)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Each	4 Units/Hour	28 Units/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Manual Cleaning: Crew members remove dirt and debris from inlets and endwalls with hand shovels. Debris removed should be loaded onto trucks and properly disposed.

Mechanized Cleaning: Remove grating from inlet and clean with vac-truck. Endwalls are cleaned with the excavator. Debris removed should be loaded onto trucks and properly disposed.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7311-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage Cleaning Inlets and Endwalls - Clogged Mechanized	None Established

Assembly Description Summary

This assembly is the cleaning of completely clogged/non-functioning inlets and endwalls. This includes cleaning inlets and endwalls, removal and disposal of material. Removing debris from a functioning inlet and/or end wall shall NOT be charged to this assembly but shall be charged to 711-7311-01.

This also includes all cleaning operations performed in the ditch channel within 15 feet of the pipe opening and one shovel length into the pipe. When cleaning ditches and drainage channels charge 711-7312-01.

In the case of a physical blockage caused by the property owner, reference Publication 23 for guidance.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a moving operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab		No materials
1	Equipment Operator	1	Vactor or		required
1	Equipment Operator (Haul)		Excavator		
1	Crew Member (Labor)	1	Haul Truck		
1-2	Crew Members (Safety)		Hand Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Each	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Mechanized Cleaning: Remove grate from inlet and clean with vac-truck. Endwalls are cleaned with excavator. Debris removed should be loaded onto trucks and properly disposed.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- M-666 "Authorization to Enter and Deposit Material" - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7312-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage Cleaning Ditches and Drainage Channels Mechanized	30 Feet/Man Hour

Assembly Description Summary
This assembly is the mechanized cleaning of parallel drainage channels (ditches and swales). This includes cleaning, reshaping, removal and disposal of material. This can normally be done from the roadway, shoulder or immediately adjacent to the shoulder.

This assembly shall provide an obstruction free flow of surface water parallel to the roadway.

In the case of a natural impairment of drainage facilities requiring entry onto private property, the first step should be to contact the property owner, explain the problem and the corrective action. Reference Publication 23 for additional guidance.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1 1 2 1-2	Foreman Equipment Operator Equipment Operators (Haul) Crew Members (Safety)	1 1 2	Crew Cab Excavator Haul Trucks		No material required

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	165 Feet/Hour	1150 Feet/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Excavation: Clean parallel drainage channels with an excavator to properly maintain the original contour by removing only debris or deposited material. Temporary erosion control measures are required if the disturbed area is within 50 feet of stream.

Erosion Control: Erosion controls such as straw bales, silt fence or rock filters are required at the point of discharge until the drainage channel re-vegetates and the area becomes stabilized. Rock filters may be installed as a more permanent control measure at the outlets.

Seeding and Mulching: The excavation of embankment slopes in conjunction with drainage channel cleaning will require that at a minimum the vertical face of the embankment be seeded and mulched and charged to 714-7716-01.

Waste Material: Excavated material is to be properly disposed and is not recommended to be broadcast onto the slopes of drainage channels.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)
- Emergency Spill Kits
- Form PA One Call (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7312-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage Cleaning Parallel Channels Manual	None Established

Assembly Description Summary
This assembly is the manual cleaning of parallel drainage channels (ditches and swales). This includes cleaning, reshaping, removal and disposal of material.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab		
1	Equipment Operators (Haul)	1	Haul Truck		No material
1-3	Crews Members		Hand Tools		required
1-2	Crew Members (Safety)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Removal: Clean parallel drainage channels to properly maintain the original contour by removing only debris or deposited material. Temporary erosion control measures are required if the disturbed area is within 50 feet of stream.

Waste Material: Any material removed is to be properly disposed of and is not recommended to be broadcast onto the slopes of drainage channels.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)
- Form PA One Call (if required) (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7312-03
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Drainage Cleaning Swales Mechanized	None Established

Assembly Description Summary
This assembly is the mechanized cleaning of perpendicular drainage channels (ditches and swales). This includes cleaning, reshaping, removal and disposal of material.

Inlet and outlet channels primarily carry water to and from cross pipes. They are generally perpendicular or slightly skewed to the centerline of the road, and often extend from or onto private property.

In the case of a natural impairment of drainage facilities requiring entry onto private property, the first step should be to contact the property owner, explain the problem and the corrective action. Reference Publication 23 for additional guidance.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab		
1	Equipment Operator	1	Excavator		No material
2	Equipment Operators (Haul)	2	Haul Trucks		required
1-2	Crew Members (Safety)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Excavation: Clean perpendicular drainage channels with an excavator to properly maintain the original contour by removing only debris or deposited material. Temporary erosion control measures are required if the disturbed area is within 50 feet of stream.

Erosion Control: Erosion controls such as straw bales, silt fence or rock filters are required at the point of discharge until the drainage channel re-vegetates and the area becomes stabilized. Rock filters may be installed as a more permanent control measure at the outlets.

Seeding and Mulching: The excavation of embankment slopes in conjunction with drainage channel cleaning will require that at a minimum the vertical face of the embankment be seeded and mulched and charged to 714-7716-01.

Waste Material: Excavated material is to be properly disposed and is not recommended to be broadcast onto the slopes of drainage channels.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)
- Form PA One Call (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7314-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage Cleaning Pipes and Culverts Mechanized	11 Feet/Man Hour

Assembly Description Summary
This assembly is the mechanical cleaning of pipes and culverts and the removal and disposal of material. This includes flushing of pipes and culverts using a high velocity sewer cleaner or sewer rooter.

Inlet and outlet channels must be cleaned before the pipe cleaner arrives at the work site and charged to "711-7312 channel cleaning and/or 711-7311 inlet cleaning".

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab		
1	Equipment Operator	1	High velocity sewer cleaner		No material required
2	Crew Members				
1	Crew Member (Safety)	1	Water Truck with pump		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	60 Feet/Hour	400 Feet/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Erosion: Temporary erosion control measures to filter flushed material shall be incorporated into the project. Straw bales or silt fence are to be installed in the drainage channel during flushing.

Waste material: Waste material flushed from the pipe or culvert shall be removed mechanically or by hand and properly disposed.

Hydraulic Unit: Flush out pipe with the hydraulic pipe cleaner and remove material at end of pipe as required.

Sewer Rooter: Position and prepare sewer rooter at outlet end of pipe. Attach smallest auger to sewer rooter and begin working auger several feet into the blockage, pull auger out with material. Continue operation for 8 to 10 feet then increase auger size and repeat operation. Increase auger sizes until entire blockage is removed. Flush out any remaining material with water supplied by the water truck.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)
- Form PA One Call (if required) (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7315-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage Install Rock Lining	None Established

Assembly Description Summary
This assembly is the installation of rock lining. This includes all actions related to the installation of rock lining in drainage channels. Cleaning and removal of debris is to be charged to 711-7312 "Drainage Cleaning".

Use Publication 72M (RC-70 Series) and Publication 464 for further guidance.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Preparation: Drainage channels shall be properly shaped before lining them with rock, charging assembly 711-7312.

Placement: The rock lining shall be placed following the contours of the drainage channel as per Publication 72M.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)
- Form PA One Call (if required) (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7321-01
		EFFECTIVE DATE July 3, 2017
ASSEMBLY Drainage – Replacement Inlets – Endwalls		PERFORMANCE STANDARD None Established

Assembly Description Summary

This assembly is the replacement of inlets and endwalls. This includes removing old material, excavating area, constructing forms, pouring concrete or appropriate material. Only pre-cast or cast-in-place concrete, or approved pre-fabricated plastic, or flared end sections shall be used.

Replacement of inlets and endwalls shall be made in accordance with Publication 408 and Publication 72M (RC-30 and RC-40 Series).

The Work Zone Traffic Control set up shall be placed in accordance with the current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 2 2 2	Foreman Equipment Operators (Haul) Crew Members (Labor Crew Members (Safety)	1 1 1 1 1	Crew Cab Haul Truck Excavator Compressor Concrete Mixer Hand Tools	As Required	Lumber, Nails and Concrete

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Each	None Established	None Established

Method and Procedure:

This varies according to job requirements.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Control
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)
- Form PA One Call (if required) (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7321-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Drainage – Repair Only Inlets – Endwalls Manual	None Established

Assembly Description Summary

This assembly is the repair only of inlets and endwalls. This includes all actions required to make repairs to inlets and endwalls.

Necessary repairs to concrete and masonry structures shall be made to restore structural integrity. Repair of inlets and endwalls shall be made in accordance with Publication 408 and Publication 72M (RC-30 and RC-40 Series).

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Each	None Established	None Established

Method and Procedure:

This varies according to job requirements.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations
- D-1 Environmental Due Diligence Form

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7324-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage – Replacement/Installation Pipes/Culverts Under 36” Diameter Mechanized	1.24 Feet/Man Hour

Assembly Description Summary

This assembly is the replacement/installation of pipes and culverts less than 36 inches in diameter. This includes cutting/sawing pavement, excavation of trench, installing pipe, backfilling, compaction and seeding and mulching. Installation of cross pipes 15 inches in diameter or less are not permitted without ADE-Maintenance approval. In accordance with the Publication 13M, the minimum diameter pipe shall be 18 inches.

Any pipe replacement project may require a permit as per Publication 23. The District shall evaluate the proposed pipe replacement locations to determine if a permit is required. If a permit is required, it shall be on site during the replacement process and strictly followed.

Replacement of the bituminous surface, installation of delineators, construction of inlets or endwalls, extra ditch cleaning beyond that which is incidental to the pipe installation (cleaning beyond 15 feet from the pipe), construction of rock filters, etc., are to be charged to the appropriate assembly.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation. Establishment of a detour where appropriate will enhance productivity and should be considered.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab		
1	Equipment Operator	1	Excavator	As required	Pipe/proper size
2	Crew Members	2	Haul Trucks		and length
2	Equipment Operators (Haul)	2	Upright Compactors		
1-2	Crew Members (Safety)	1	Compressor with pavement breaker and/or pavement	As required	Pipe Bands
			saw	As required	Aggregate

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	9 Feet/Hour	65 Feet/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Preparation: The site should be reviewed prior to the start of work to determine type, size, length and location of the replacement pipe required; type and quantity of backfill; type of end treatments required; traffic control requirements; and evaluate for any unusual conditions that may need to be addressed including the presence of running water or wetlands. PA-One Call shall be made at least three days prior to the start of any excavation, as per the PA-One Call Law. If no equipment remains on site for 10 calendar days, a renewal is required.

Cutting: The pavement should be cut in advance of the pipe installation operation. Full depth and width saw cut is recommended. Pneumatic hammer or cutter is acceptable, assuming the pavement is cut to its full depth. Scoring pavement with excavator bucket is not acceptable.

Trench Width: The trench width shall be a minimum of 2 feet wider and no greater than 4 feet wider than the outside diameter of the pipe. Additional width may be required due to safety concerns or encountering unsuitable material.

Trench Stability: Trenches 5 feet or more in depth, shall be shored or laid back to a stable slope. Trenches less than 5 feet shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected. Refer to Appendix A: Table 4-1 for slope layback details and to Table 4-2 for shoring details.

Trench Depth: Excavate trench to required depth and as close to the desired slope as possible. The minimum slope is 1/4 inch per foot where attainable. Remove any unacceptable material to an extra 1 foot depth below grade line and add approved material to desired slope and compact.

Bedding: Place bedding material (2A aggregate) to a minimum loose depth of 6 inches. Note that when placing concrete pipe, the required bedding material will be a combination of AASHTO #8 and 2A. AASHTO #8 is to be placed to a minimum loose depth of 6 inches with 2A placed under the outlet end section only, to a compacted depth of 6 inches.

Cradle: Construction of a cradle will be required for squash or elliptical pipe only. Cradle construction will consist of the introduction of additional loosely placed bedding material shaped via cradle boards to the same contour as the exterior of the pipe such that when complete, the invert of the pipe will rest on the bed which is to remain a minimum of 6 inches in depth.

Cradle Depth: The depth of the required cradle for squash pipe is to be 15 percent of the vertical rise of the pipe, approximately 3 inches for a 24 x 18 pipe.

Placement: Place pipe in center of prepared bed/cradle; properly align and join succeeding sections following the proper horizontal alignment. The minimum slope is 1/4 inch per foot where attainable.

Backfill: Backfill by placing 2A aggregate in uniform, compacted lifts of 4 inches if using an upright compactor; or 8 inches if using a vibratory compactor. The first lift may be slightly thicker to avoid pipe displacement during compaction. Backfill in uniform lifts until compacted backfill is even with road pavement or appropriate grade is obtained for the placement of the bituminous surface. Do not compact directly over the center line of the pipe until 1 foot of cover has been attained.

End Treatment: Endwalls should be placed prior to the backfill placement. Allow space for the placement of endwalls or inlet if they are to be constructed after the pipe is completely installed.

Erosion Control: Temporary erosion control measures are required if the pipe outlet is within 50 feet of a perennial stream (flowing water). Appropriate erosion control measures shall be taken until the disturbed areas have re-vegetated, according to Publication 464.

Project Waste: Segregate the excavated pipe from the waste material. Clean up the work area of all debris at the end of the day.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation
- Pub 517 Job Safety Analysis (Required on Site)
- Environmental Permit (if required) (Required on Site)
- Form PA One Call (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7324-02
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage – Replacement/Installation Pipes/Culverts 36” Diameter and Over Mechanized	.53 Feet/Man Hour

Assembly Description Summary

This assembly is all actions related to the replacement/installation of pipes and culverts 36 inch and over in diameter. This includes cutting/sawing pavement, excavation of trench, installing pipe, backfilling, compaction and seeding and mulching.

Any pipe replacement project may require a permit as per Publication 23. The District shall evaluate the proposed pipe replacement locations to determine if a permit is required. If a permit is required, it shall be on site during the replacement process and strictly followed.

Replacement of the bituminous surface, installation of delineators, construction of inlets or endwalls, extra ditch cleaning beyond that which is incidental to the pipe installation (cleaning beyond 15 feet from the pipe), construction of rock filters, etc., are to be charged to the appropriate assembly.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation. Establishment of a detour where appropriate will enhance productivity and should be considered.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1	Foreman	1	Crew Cab		
1	Equipment Operator	1	Excavator	As Required	Pipe/proper size
2-3	Crew Members	2	Haul Trucks		and length
2	Equipment Operators (Haul)	2	Vibratory Compactors	As Required	Bands
2	Crew Members	1	Compressor with pavement breaker and/or pavement saw	As Required	Aggregate

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	4.8 Feet/Hour	32 Feet/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Preparation: The site should be reviewed prior to the start of work to determine type, size, length and location of the replacement pipe required; type and quantity of backfill; type of end treatments required; traffic control requirements; and evaluate for any unusual conditions that may need to be addressed including the presence of running water or wetlands. PA-One Call shall be made at least three days prior to the start of any excavation, as per the PA-One Call Law. If no equipment remains on site for 10 calendar days, a renewal is required.

Cutting: The pavement should be cut in advance of the pipe installation operation. Full depth and width saw cut is recommended. Pneumatic hammer or cutter is acceptable, assuming the pavement is cut to its full depth. Scoring pavement with excavator bucket is not acceptable.

Trench Width: The trench width shall be a minimum of 2 feet wider than the outside diameter of the pipe for pipes less than 48 inches in diameter. Larger pipes require 2 ½ feet, and no greater than 4 feet wider than the outside diameter of the pipe. Additional width may be required due to safety concerns.

Trench Stability: Trenches 5 feet or more in depth, shall be shored or laid back to a stable slope.

Trenches less than 5 feet shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected. Refer to Appendix A: Table 4-1 for slope layback details and to Table 4-2 for shoring details.

Trench Depth: Excavate trench to required depth and as close to the desired slope as possible. The minimum slope is 1/4 inch per foot. Remove any unacceptable material to an extra 1 foot depth below grade line and add approved material to desired slope and compact.

Bedding: Place bedding material (2A aggregate) to a minimum loose depth of 6 inches. Note that when placing concrete pipe, the required bedding material will be a combination of AASHTO #8 and 2A. AASHTO #8 is to be placed to a minimum loose depth of 6 inches with 2A placed under the outlet end section only, to a compacted depth of 6 inches.

Cradle: Construction of a cradle will be required for squash or elliptical pipe only. Cradle construction will consist of the introduction of additional loosely placed bedding material shaped via cradle boards to the same contour as the exterior of the pipe such that when complete, the invert of the pipe will rest on the bed which is to remain a minimum of 6 inch depth.

Cradle Depth: The depth of the required cradle for squash pipe is to be 15 percent of the vertical rise of the pipe, approximately 3 inches for a 24 x 18 pipe.

Placement: Place pipe in center of prepared bed/cradle; properly align and join succeeding sections following the proper horizontal alignment. The minimum slope is 1/4 inch per foot where attainable.

Backfill: Backfill by placing 2A aggregate in uniform, compacted lifts of 4 inches if using an upright compactor; or 8 inches if using a vibratory roller. The first lift may be slightly thicker to avoid pipe displacement during compaction. Backfill in uniform lifts until compacted backfill is even with road pavement or appropriate grade is obtained for the placement of the bituminous surface. Do not compact directly over the center line of the pipe until 1 foot of cover has been attained.

End Treatment: Endwalls should be placed prior to the backfill placement. Allow space for the placement of endwalls or inlet if they are to be constructed after the pipe is completely installed.

Erosion Control: Temporary erosion control measures are required if the pipe outlet is within 50 feet of a perennial stream (flowing water). Appropriate erosion control measures shall be taken until the disturbed areas have revegetated, according to Publication 464.

Project Waste: Segregate the excavated pipe from the waste material. Clean up the work area of all debris at the end of the day.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Environmental Permit (if required) (Required on Site)
- Form PA One Call (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17)	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7324-03
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Drainage – Replacement/Installation Pipes Parallel Mechanized	None Established

Assembly Description Summary

This assembly is all actions related to the replacement/installation of parallel pipes. This includes saw cutting shoulder, excavation of trench, the installation of pipe, backfilling and compacting.

Any pipe replacement project may require a permit as per Publication 23. The District shall evaluate the proposed pipe replacement locations to determine if a permit is required. If a permit is required, it shall be on site during the replacement process and strictly adhered to.

Replacement of the bituminous surface, installation of delineators, construction of inlets or endwalls, extra ditch cleaning beyond that which is incidental to the pipe installation (cleaning beyond 15 feet from the pipe), construction of rock filters, etc., are to be charged to the appropriate assembly.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation. Establishment of a detour where appropriate will enhance productivity and should be considered.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab		
1	Equipment Operator	1	Excavator	As Required	Pipe/proper
2	Crew Members	2	Haul Trucks		size and length
2	Equipment Operators (Haul)	2	Upright Compactors		
1-2	Crew Members (Safety)	1	Compressor with pavement breaker and/or pavement saw	As Required	Pipe Bands
				As Required	Aggregate

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Preparation: The site should be reviewed prior to the start of work to determine type, size, length and location of the replacement pipe required; type and quantity of backfill; type of end treatments required; traffic control requirements; and evaluate for any unusual conditions that may need to be addressed including the presence of running water or wetlands. PA-One Call shall be made at least three days prior to the start of any excavation, as per the PA-One Call Law. If no equipment remains on site for 10 calendar days, a renewal is required.

Cutting: The pavement should be cut in advance of the pipe installation operation. Full depth and width saw cut is recommended. Pneumatic hammer or cutter is acceptable, assuming the pavement is cut to its full depth. Scoring pavement with excavator bucket is not acceptable.

Trench Width: The trench width shall be a minimum of 2 feet wider and no greater than 4 feet wider than the outside diameter of the pipe. Additional width may be required due to safety concerns.

Trench Stability: Trenches 5 feet or more in depth, shall be shored or laid back to a stable slope. Trenches less than 5 feet shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected. Refer to Appendix A: Table 4-1 for slope layback details and to Table 4-2 for shoring details.

Trench Depth: Excavate trench to required depth and as close to the desired slope as possible. The minimum slope is 1/4 inch per foot where attainable. Remove any unacceptable material to an extra 1 foot depth below grade line and add approved material to desired slope and compact.

Bedding: Place bedding material (2A aggregate) to a minimum loose depth of 6 inches. Note that when placing concrete pipe, the required bedding material will be a combination of AASHTO #8 and 2A. AASHTO #8 is to be placed to a minimum loose depth of 6 inches with 2A placed under the outlet end section only, to a compacted depth of 6 inches.

Cradle: Construction of a cradle will be required for squash or elliptical pipe only. Cradle construction will consist of the introduction of additional loosely placed bedding material shaped via cradle boards to the same contour as the exterior of the pipe such that when complete, the invert of the pipe will rest on the bed which is to remain a minimum of 6 inches in depth.

Cradle Depth: The depth of the required cradle for squash pipe is to be 15 percent of the vertical rise of the pipe, approximately 3 inches for a 24 x 18 pipe.

Placement: Place pipe in center of prepared bed/cradle; properly align and join succeeding sections following the proper horizontal alignment. The minimum slope is 1/4 inch per foot where attainable.

Backfill: Backfill by placing 2A aggregate in uniform, compacted lifts of 4 inches if using an upright compactor; or 8 inches if using a vibratory compactor. The first lift may be slightly thicker to avoid pipe displacement during compaction. Backfill in uniform lifts until compacted backfill is even with road pavement or appropriate grade is obtained for the placement of the bituminous surface. Do not compact directly over the center line of the pipe until 1 foot of cover has been attained.

End Treatment: Endwalls should be placed prior to the backfill placement. Allow space for the placement of endwalls or inlet if they are to be constructed after the pipe is completely installed.

Erosion Control: Temporary erosion control measures are required if the pipe outlet is within 50 feet of a perennial stream (flowing water). Appropriate erosion control measures shall be taken until the disturbed areas have re-vegetated, according to Publication 464.

Project Waste: Segregate the excavated pipe from the waste material. Clean up the work area of all debris at the end of the day.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Environmental Permit (if required) (Required on Site)
- Form PA One Call (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7324-04
		EFFECTIVE DATE July 3, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage – Replacement/Installation Pipes Extension Only	None Established

Assembly Description Summary
This assembly is all actions related to the extension of existing pipe installation. The pipe extensions should match the type and size of the existing pipe, with the pipe joint properly secured to prevent separation. Extensions should be of a sufficient length to meet the slope – flowline intercept.

Any existing pipe alteration project may require a permit as per Publication 23. The District shall evaluate the proposed scope of work and locations to determine if a permit is required. If a permit is required, it shall be on site during the project duration and strictly followed.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies according to job requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Preparation: The site should be reviewed prior to the start of work to determine type, size, length and location of the replacement pipe required; type and quantity of backfill; type of end treatments required; traffic control requirements; and evaluate for any unusual conditions that may need to be addressed including the presence of running water or wetlands. PA-One Call shall be made at least three days prior to the start of any excavation, as per the PA-One Call Law. If no equipment remains on site for 10 calendar days, a renewal is required.

Cutting: If required the pavement should be cut in advance of the pipe installation operation. Full depth and width saw cut is recommended. Pneumatic hammer or cutter is acceptable, assuming the pavement is cut to its full depth. Scoring pavement with excavator bucket is not acceptable.

Trench Width: The trench width shall be a minimum of 2 feet wider and no greater than 4 feet wider than the outside diameter of the pipe. Additional width may be required due to safety concerns.

Trench Stability: Trenches 5 feet or more in depth, shall be shored or laid back to a stable slope. Trenches less than 5 feet shall also be effectively protected when examination of the ground indicates hazardous ground movement may be expected. Refer to Appendix A: Table 4-1 for slope layback details and to Table 4-2 for shoring details.

Trench Depth: Excavate trench to required depth and as close to the desired slope as possible. The minimum slope is 1/4 inch per foot where attainable. Remove any unacceptable material to an extra 1 foot depth below grade line and add approved material to desired slope and compact.

Bedding: Place bedding material (2A aggregate) to a minimum loose depth of 6 inches. Note that when placing concrete pipe, the required bedding material will be a combination of AASHTO #8 and 2A. AASHTO #8 is to be placed to a minimum loose depth of 6 inches with 2A placed under the outlet end section only, to a compacted depth of 6 inches.

Cradle: Construction of a cradle will be required for squash or elliptical pipe only. Cradle construction will consist of the introduction of additional loosely placed bedding material shaped via cradle boards to the same contour as the exterior of the pipe such that when complete, the invert of the pipe will rest on the bed which is to remain a minimum of 6 inches in depth.

Cradle Depth: The depth of the required cradle for squash pipe is to be 15 percent of the vertical rise of the pipe, approximately 3 inches for a 24 x 18 pipe.

Placement: Place pipe in center of prepared bed/cradle; properly align and join succeeding sections following the proper horizontal alignment. The minimum slope is 1/4 inch per foot where attainable.

Backfill: Backfill by placing 2A aggregate in uniform, compacted lifts of 4 inches if using an upright compactor; or 8 inches if using a vibratory compactor. The first lift may be slightly thicker to avoid pipe displacement during compaction. Backfill in uniform lifts until compacted backfill is even with road pavement or appropriate grade is obtained for the placement of the bituminous surface. Do not compact directly over the center line of the pipe until 1 foot of cover has been attained.

End Treatment: Endwalls should be placed prior to the backfill placement. Allow space for the placement of endwalls or inlet if they are to be constructed after the pipe is completely installed.

Erosion Control: Temporary erosion control measures are required if the pipe outlet is within 50 feet of a perennial stream (flowing water). Appropriate erosion control measures shall be taken until the disturbed areas have re-vegetated, according to Publication 464.

Project Waste: Segregate the excavated pipe from the waste material. Clean up the work area of all debris at the end of the day.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation
- Pub 517 Job Safety Analysis (Required on Site)
- Environmental Permit (if required) (Required on Site)
- Form PA One Call (Required on Site)
- Cold Water (if required)
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7324-05
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Drainage Pipe Trenches Trench Restoration Manual	.22 Ton/Man Hour

Assembly Description Summary

This assembly is the placing of a bituminous surface/base course after a pipe replacement. This includes all actions related to the restoration of a pipe trench with a bituminous base course, and bituminous wearing course (if required). It includes, but may not be limited to, removing temporary backfill to a predetermined depth, re-cutting the surrounding pavement (1 foot minimum from the original cut), sweeping, applying TACK, placing bituminous material and compacting.

Comingled milled material excavated from the trench should be stockpiled for future use such as shoulder stabilization. Waste materials used in shoulder areas must be stabilized. Rolling this material is acceptable stabilization. Waste materials shall not be placed in wetlands or waterways.

Subsequent visits to repair depressions are to be charged to 711-7121-01 - Manual Patching - Standard.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As Required	Bituminous
2-3	Equipment Operators	1-2	Haul Truck		Material
2	Crew Members	1	Excavator		
2	Crew Members (Safety)	1	Pavement saw, skid steer with milling attachment or compressor with pavement breaker,	As Required	TACK
		1	Roller (Min. 4-6 Ton)		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Ton	1.4 Tons/Hour	10 Tons/Day

Method and Procedure:

Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's activities.

Marking: The area to be removed is marked with paint, keel or chalk line and shall not delay the day's operation. A minimum of 1 foot from each side of the original pipe trench or 1 foot additional beyond any damaged areas or irregularity is to be removed. Markings should be parallel with the original pipe trench excavation.

Cutting: Cut the pavement full depth, a minimum of one foot from each side of the original pavement cut; if the adjacent pavement is greater than 6 inch depth and a miller is used, mill a notch to a minimum 6 inch depth. If the pavement was damaged beyond the one foot mark during pipe replacement or trench restoration, then cut to the outermost point of irregularity. Pavement cuts should be straight and parallel with no irregularities.

Excavation & Sub-Base Compaction: Excavate to a depth equal to that of the adjacent pavement. For pavements less than 4 inches, excavate to a minimum depth of 4 inches. For pavements greater than 6 inch depth, excavate to a minimum 6 inch depth. Uniformly grade the sub-base and compact the prior to backfilling with asphalt.

Cleaning and TACK: Clean vertical edges with compressed air or by broom. Apply approved TACK uniformly to all exposed bituminous surfaces. Using a broom or hand brush is an acceptable means of applying TACK.

Filling: Place and evenly distribute bituminous material in the excavated area, using shovels and lutes. Match the existing pavement thickness. For pavements exceeding 6 inches in depth, fill to a minimum of 6 inches (it is not necessary to exceed 6 inch depth). Place material in uniform lifts and compact, allowing material to sufficiently cool before applying the next lift. Do not exceed the maximum lift size or maximum overall thickness for the material being placed; wearing course material must not exceed 3 inches total depth. Allow 1/4 inch of loose material per inch of compacted depth (rule of thumb is 1 1/4 inches loose depth will equal 1inch compacted).

Compaction: Clean adjacent surfaces of all material and debris prior to compaction so rollers do not bridge any areas of the patch. Compact with a vibratory roller, or a 4-6 ton roller. Pinch roll edges on the surface lift when possible.

Finish: Ensure that the surface of the patch is uniform and conforms to the grade and profile of the adjacent pavement. Do not leave any depressions or bumps greater than 1/4 inch.
Clean up all loose debris and litter from the work area.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Temperature Gauge (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)
- Form PA One Call (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7324-09 **EFFECTIVE DATE** July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage – Replacement Pipes/Culverts Stockpiling Cost Only	None Established

Assembly Description Summary
This assembly is all actions related to stockpiling (hauling) costs for drainage operations prior to actually performing the work when the location of work is not known. Under no circumstances shall site preparation, saw cuts, finishing work etc. be charged to this Method 09 code. When the operation begins Method 01, 02 or 03 shall be charged.

Production is **always** reported as Zero (0) feet. An SR, segment and/or offset is not required when reporting this Method.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/ crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Zero	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7325-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Repair or Replacement of Structures under 8’ in length	None Established

Assembly Description Summary

This assembly is all actions related to the repair or replacement of a masonry, concrete, or wood structure (arch culvert, box culvert, slab or wood deck structure, masonry structure, etc.) under 8 feet in span length and which cannot be charged to 711-7324 pipe or culvert replacements.

All work including cleaning, painting, repainting, under pinning, deck repair or replacement, abutment repair or replacement, wing wall repair or replacement, etc. is to be charged to this assembly.

Complete replacement shall be accomplished with the approval of the ADE-Maintenance and shall be charged to this activity even if the replacement structure increases the span length to greater than 8 feet. After completion, the structure over 8 feet shall be assigned a structure I.D. number and future maintenance work charged to the appropriate bridge assembly.

Any existing pipe alteration project may require a permit as per Publication 23. The District shall evaluate the proposed scope of work and locations to determine if a permit is required. If a permit is required, it shall be on site during the project duration and strictly followed.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly can be either a short-term or a long-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/ crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Varies according to job requirements.

Site specific erosion and sedimentation control plan may be necessary.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Form PA One Call (if required) (Required on Site)
- Environmental Permit (if required) (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (if required) (Required on Site)
- D-1 Environmental Due Diligence Form (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7326-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage Pipes/Culverts – Repair	None Established

Assembly Description Summary
This assembly is all actions related to the repair of pipes and culverts. This includes installing a pipe liner, repairing a pipe, etc.

Any existing pipe alteration project may require a permit as per Publication 23. The District shall evaluate the proposed scope of work and locations to determine if a permit is required. If a permit is required, it shall be on site during the project duration and strictly followed.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/ crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

Preparation: The site should be reviewed prior to the start of work to determine type, size, length and location of the replacement pipe required; type and quantity of backfill; type of end treatments required; traffic control requirements; and evaluate for any unusual conditions that may need to be addressed including the presence of running water or wetlands. PA-One Call shall be made at least three days prior to the start of any excavation, as per the PA-One Call Law. If no equipment remains on site for 10 calendar days, a renewal is required.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls
- Pub 517 Job Safety Analysis (Required on Site)
- Form PA One Call (if required) (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)
- Environmental Permit (if required) (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L (7-17) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7328-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	**PERFORMANCE STANDARD**
Drainage - Installation Sub-surface Drains (U-Drain)	None Established

Assembly Description Summary
This assembly is all actions related to the installation of sub-surface drains/U-drain.

Publication 23, provides guidance on the installation and location of sub-surface drains/U-drains. The amount of water, type of soil and type of pipe being used are all factors to take into consideration.

Work is to be accomplished in accordance with Publication 72M (RC-30M) and Publication 408.

The Work Zone Traffic Control set up shall be placed in accordance with current Publication 213. This assembly is typically a short-term stationary operation.

All incidental activities related to the project shall be charged to this assembly. This includes, but is not limited to, WZTC, mobilization to and from the actual job site (to include district and regional personnel/crews), the hauling of materials (to and from the job site), sweeping, cleaning of equipment (after the project), and cleaning of the road prior to and after the assembly, etc.

ASSEMBLY RECOMMENDATIONS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies according to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet	None Established	None Established

Method and Procedure:
Varies according to job requirements.

Forms, Publications and Equipment

- Pub 23 Maintenance Manual
- Pub 72M Roadway Construction Standards
- Pub 213 Work Zone Traffic Control (Required on Site)
- Pub 408 Highway Construction Specifications
- Pub 445 Safety Policy Manual (Required on Site)
- Pub 464 Maintenance Field Reference For Erosion And Sedimentation Controls

- Pub 517 Job Safety Analysis (Required on Site)
- Form PA One Call (Required on Site)
- Environmental Permit (if required) (Required on Site)
- Cold Water
- First Aid Kit (Required on Site)
- Emergency Spill Kits (Required on Site)
- M-666 “Authorization to Enter and Deposit Material” - Material Storage off site locations (Required on Site)
- D-1 Environmental Due Diligence Form (Required on Site)

* Environmental concerns shall be considered and verified with the district environmental unit in the planning process.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7331-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roadway Section Restoration Side Dozing Mechanized	66 Ft./Man Hr

Assembly Description Summary

This assembly includes all actions related to the removal of accumulated material from beneath guiderail such as: side dozing of vegetation and soil buildup and manually shoveling embankment if stroke of side dozer is insufficient; or manually filling of small washouts along the job course.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213. This assembly is typically a short-term stationary operation.

Environmental concerns such as wetlands, erosion control, water way pollution are to be addressed in the performance of this operation and the disposal of waste material. Waste materials shall not be placed in wetlands or waterways. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman (Part Time)	1	Crew Cab		No material required
1	Equipment Operator	1	Tractor with side dozer		
1	Equipment Operator (Safety)	1	Shadow vehicle		
1	Crew Member (Labor)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet Code 4	230 Feet/Hr.	1600 Feet/Day

Method and Procedure:
Prior to the beginning of work, the Foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

Operator will position tractor and start side dozing and crew member will follow outside guide fence, finishing the operation with a shovel.

Foreman should see that the job is properly started and foreman is then available for another job.

Erosion control measures are required when side dozing next to a perennial stream (flowing water) that parallels the roadway and there is an insufficient vegetative strip between the disturbed area and stream to naturally filter runoff.

Any of the following options may be selected.

*Place straw bales or silt fence between disturbed area and stream.
*Seed and mulch disturbed area.
*Load out excess material and properly dispose.
*Cut Bleeders at thirty (30) foot intervals.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7332-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roadway Section Restoration Gabions and Retaining Walls Install/Repair	66 Ft./Man Hr

Assembly Description Summary
This assembly includes all actions related to the installation or repair of gabions and retaining walls such as removal of material, shoring the area, building supports, etc.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

The Work Zone Traffic control set up shall be in accordance with Pub. #213. The appropriate Figure is to be selected from Table 5, Appendix A of Pub. 203 and the traffic control set up accordingly with the selected figure.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 9	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7333-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roadway Section Restoration Slides Non Storm Related	None Established

Assembly Description Summary
This assembly includes all actions related to restoration operation not caused by storms or natural disasters. See 711-7341-01 for more details.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

The Work Zone Traffic control set up shall be erected in accordance with Pub. #213.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Sites Code 9	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7334-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Roadway Section Restoration Graffiti Removal Manual/Mechanical	None Established

Assembly Description Summary
This assembly includes all actions related to the removal of graffiti from any Department facilities.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7341-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Damage and/or Disaster Restoration Slides, Flooding, Washouts, or Other Roadway Section Restoration	None Established

Assembly Description Summary

This assembly includes all actions related to restoration operations caused by storms or natural disasters regardless of the degree of damage. Assemblies include: Disaster clean up; removal and disposal of debris from slides; clean up, repair and/or replacement operations caused by flooding; repair of cuts and fills, dressing slopes and washouts, bench cleaning, repair of sink holes, etc. Minor work performed while on storm patrol shall be charged to 711-7351.

Where frequent washouts are a problem, consideration should be given to using Gabion Baskets to control erosion. Gabion Baskets must conform Form 408 and Drawing RC-43, Pub. #72.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

Environmental concerns such as wetlands, erosion control, waterway pollution are to be addressed in the disposal of excavated and waste materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

Varies according to job requirements.

Disturbed areas must be stabilized upon completion of restoration work.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7342-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Damage and/or Disaster Restoration Structure Damage	None Established

Assembly Description Summary

This assembly includes all actions related to the repair or replacement of structures when the damage is caused by storms or natural disasters regardless of the degree of damage.

The Work Zone Traffic Control set up shall be erected in accordance with Pub. #213.

This assembly is stationary and may be either short or long term in duration.

Environmental concerns such as wetlands erosion control, waterway pollution are to be addressed in the disposal of excavated and waste materials. Refer to Maintenance Manual, Chapter 3, Erosion and Sedimentation Control.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Waste materials shall not be placed in wetlands or waterways. Waste materials must be stabilized. Rolling is acceptable stabilization.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the days' assemblies.

Varies according to activity requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7351-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Storm Patrol Rain or Wind Patrol	None Established

Assembly Description Summary
This assembly includes all actions related to patrolling of highways during and immediately after storms to check function of drainage and erosion control facilities or evaluate hazard potential for motorists, etc. Includes cleaning minor surface debris from drains and roadway, removing fallen trees and branches from the traveled way and any other actions required as a result of the storm. Any drain cleaning which requires the removal and disposal of material other than minor surface debris shall be charged to 711-7311.

This is an unscheduled assembly, therefore, all incidental work done while on patrol should be charged to this assembly.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 711-7431-01 thru 711-7459-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Bridge Maintenance Cost Functions	Refer to Publication #55

Assembly Description Summary
Reference the Coding Charts (Pages 3-42 to 3-43) for Bridge Maintenance assembly numbers, titles and/or units of measure. Detailed description of the bridge maintenance assemblies are in a new manual titled "Procedures and Standards for Bridge Maintenance" (Publication #55).

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	REFER TO PUBLICATION #55				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
REFER TO PUBLICATION #55		

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 711-7491-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Special Charge Hauling Equipment – Non-disabled Lowboy Operator Only	None Established

Assembly Description Summary
This assembly includes all actions related to the hauling of non-disabled equipment using a Lowboy. Hauling charges that result from a piece of equipment requiring PM or being disabled must be charged to the appropriate Program 813 assembly.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Equip. Operator	1 1	Truck-Tractor Trailer		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 712-7521-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Snow and Ice Control Plowing, Spreading Anti-skid/Chemicals, Plowing/Spreading Simultaneously - Truck Plowing - Grader	None Established

Assembly Description Summary

This assembly includes installing chains, making minor chain repairs, plowing and removing snow, spreading chemicals/anti-skid, refueling, cleanup, attaching/detaching the plow, safety rider's time, foreman's supervision time, widening, etc. Time spent to construct, repair or install an "A" frame or any other type of plow frame shall be charged to 813-8366-01. The replacing of worn out plow blades will be charged to 712-7522-01. Other assemblies charged to this assembly include loader operators time, and other miscellaneous assemblies at the stockpile during or immediately after a storm ceases.

There is a statewide Department initiative to have winter service trucks equipped with liquid material treatment capabilities. It is imperative the liquid treatment material (Salt Brine, Magnesium Chloride, etc.) be reported on the payroll with the salt and or anit-skid in order to track winter material usage and cost.

Plowing and/or spreading technique vary according to the type of plow used, the width of the highway, and the severity of the storm. When manpower and equipment are availabe, it can be advantageous to tandem plow on two lane roads. By using two plows, one can plow back at the same time the other vehicle is clearing the travel lane. This will prevent traffic from scattering unplowed snow back on to the roadway before a second pass can be made. Because of their slower speed, graders, should be used only if truck plowing cannot keep up with the storm or if special conditions (thick ice) require controlled pressure on the blade.

Operators must have had prior instruction on proper operation of equipment while plowing and/or spreading under varying conditions. Tire chains shall be carried on trucks and used when conditions require them. Refer to Pub. #23 (Maintenance Manual), Chapter 4, Winter Activities During December, January, February and March.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 1	Equipment Operator Non-Oper. (Safety) (If Required)	1 1	Dump Truck or Grader Plow -"V" "One Way" "Reversible", "Wing" Spreader	 Tons Gallons	Anti-Skid, Salt Salt Brine

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
PLOWING:

After plow is mounted, yard preparation consists of usual daily service checks with special attention to flasher lights and hydraulic systems.

Foreman gives operator safety instructions.

Operator plows snow in the direction of traffic maintaining a speed great enough to move the snow well into the shoulder, but it should not be so high that the snow damages adjoining private property or highway signs.

After operation is completed, wash off equipment.

Note: When plowing through drifts or deep snow (over 12") a "V" plow should be used if available. "V" plows tend to balance the side thrust on the driving unit and will thus reduce equipment breakdowns and maintenance.

SPREADING AND PLOWING/SPREADING SIMULTANEOUSLY:

Foreman gives operator rate of application (low, medium, or high).

Tailgate Spreader - Operator sets chain on tailgate to position determined when the truck was calibrated. (Calibration is based on maintaining a 20 MPH speed, the operator may adjust his auger/spinner control to compensation for any variation from this average speed).

Hopper Spreader - Operator estimated the average speed he will travel and makes his gate setting as determined from the calibration chart located in the cab of each truck.

Operator, at the beginning of a storm, covers predesigned locations which become hazardous immediately. These locations will include bridge decks, steep grades, sharp curves, and major intersections.

After operation is completed, wash off truck and truck bed.

Zero Velocity Spreader - Operator will estimate average speed traveled and pre-set computer controls as determined by calibration chart located in truck cab.

Clean "Ventura Plate" after each load of salt is spread.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 712-7522-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Snow and Ice Control Other	None Established

Assembly Description Summary
This assembly includes all actions related to snow season work that is not included in assembly 712-7521-01 such as snow fence, snow prep work, mixing winter materials, transferring material, maintenance of storage facilities, towing, dry runs, stand by, calling out crews, removing or calibrating the spreader, etc.

This assembly also includes maintenance employe's time when assigned to operate telephone & two-way radios for winter traffic operations outside of normal office hours for the period November 1 thru March 31. Any other charges for operating two-way radios during normal office hours should be charged to 719-9829-01.

Do not charge lighting cost for stockpile areas to this assembly. These costs should be charged to assemlby 822-1204-01.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements		Truck-Tractor Trailer		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 712-7523-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Snow and Ice Control Anti-Icing Operations	

Assembly Description Summary

This assembly includes all actions related to applying Anti-Icing chemicals to pavement surface prior to the storm to prevent bond forming. This assembly should not be used to change for pre-wetting of solid material.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements		Truck-Tractor Trailer		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 712-7524-01
		EFFECTIVE DATE July 1, 2014
ASSEMBLY Snow and Ice Control Salt Brine Manufacture		**PERFORMANCE STANDARD** None Established

Assembly Description Summary
This assembly includes all actions related to the manufacturing of salt brine & procedures needed to tranfer this product for use by other organizations.

Salt or solar salt is purchased and inventoried for the production of salt brine. The manufactured product (Salt Brine) is then inventoried as a no-valued material.

The producing plant must perform a second transaction if the material is to be transferred to another plant. The MB1B transaction, movement type 303 will be required. The receiving plant will need to receive the transferred material by using MB1B transaction, movement type 035.

This requires a procedure to document production costs to support transfer of funds for a material which is considered non-valuated. This assembly (712-7524-01) has been created. It will become a Standing Work Order which is to be extended to each Plant. Those organizations tracking costs on I80 will require a second work order created against this assembly. This Work Order will be used for production only. It will allow the producing organization to directly charge another Plant for production costs when it is known who the receiving organization will be. If the material is produced for use in the Plant of origin it will be manually receipted into inventory for tracking purposes.

When salt brine is transferred to another Plant from stock, the receiving organizations Work Order will be charged when producing replacement inventory. Costing to the receiving organization will be accomplished in this manner. It will however require planning and inventory monitoring as spring approaches.

The transfer of salt brine will be charged to the existing Work Order for assembly 712-7522-01, “Other Winter Activities”. The use of this work order will capture labor and equipment costs incurred when transferring a non-valuated material. The receiving organizations Work Order will be charged regardless of who is hauling the material.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7611-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Pavement Marking Yellow Traffic Line Painting Mechanized	None Established

Assembly Description Summary
This assembly includes all actions related to the painting or repainting of yellow traffic lines using line striping machines.

Elements of this operation include loading materials, travel, paint and bead application, paint machine calibration and quality assurance checks, minor equipment repairs or adjustments, and other assemblies directly related to traffic line painting.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Pick-up Truck		Paint (gallons)
2	Gun Operator	1	Paint Machine	As Req'd	Glass Beads
2	Equipment Operator	1	Supply Truck		pounds)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Line Mile Code 0	8 Line Miles/Hour	60 Line Miles/Day

Method and Procedure:
Varies according to job requirements.

See the Pavement Marking Handbook for additional information.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7612-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Pavement Marking White Traffic Line Painting Mechanized	None Established

Assembly Description Summary
This assembly includes all actions related to the painting or repainting of white traffic lines using line striping machines.

Elements of this operation include loading materials, travel, paint and bead application, paint machine calibration and quality assurance checks, minor equipment repairs or adjustments, and other assemblies directly related to traffic line painting.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Pick-up Truck		Paint (gallons)
2	Gun Operator	1	Paint Machine	As Req'd	Glass Beads
2	Equipment Operator	1	Supply Truck		(pounds)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Line Mile Code 0	8 Line Miles/Hour	60 Line Miles/Day

Method and Procedure:
Varies according to job requirements.

See the Pavement Marking Handbook for additional information.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7613-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Pavement Marking Traffic Line Painting Hand Operated Machines	None Established

Assembly Description Summary
This assembly includes all actions related to marking the pavement using hand operated machines and/or hand held rollers, such as painting gore areas, certain types of ramps, and other areas not readily accessible to the Department's large paint trucks.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Gallons Code 5	None Established	None Established

Method and Procedure:
Varies according to job requirements.

See Pavement Marking Handbook for additional information.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7614-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Pavement Marking Repair/Replacement Reflectorized Pavement Markers	None Established

Assembly Description Summary
This assembly includes all actions related to the repair/replacement of reflectorized pavement markers such as removing and replacing damaged reflectors. (Could be raised, flush, or recessed).

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7615-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Pavement Marking Paint Line Eradication	None Established

Assembly Description Summary
This assembly includes all actions related to the removal of traffic markings.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man-hour Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7616-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Pavement Marking Thermo Plastics Installation	None Established

Assembly Description Summary
This assembly includes all actions to installation of thermo plastic markings.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man-hour Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirement.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7617-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Pavement Marking Pavement Machine Repair	None Established

Assembly Description Summary
This assembly includes all actions related to the repair of paint machines by the Paint Crew only.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7618-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Pavement Marking Small Paint - Waterborne	None Established

Assembly Description Summary
This assembly includes all actions related to the Small Paint Program – WATERBORNE

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7618-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Pavement Marking Small Paint - Durable	None Established

Assembly Description Summary
This assembly includes all actions related to the Small Paint Program – **DURABLE.**

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7619-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Pavement Marking Other	None Established

Assembly Description Summary

This assembly includes all actions related to any miscellaneous pavement marking assembly which cannot be properly charged to the previous marking codes. Examples include transferring materials between counties, traffic line layouts, winterization of the large paint machines, etc.

The installation of temporary traffic pavement markings should be charged to the maintenance assembly that is being accomplished.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hour Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7621-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Signs Construction, Detour and Other Temporary Signs	.80 Sites/Man Hr

Assembly Description Summary

This assembly is used only for General Maintenance Department Force projects. Includes all actions related to the erection, maintenances and removal of construction, detour and other temporary signs, such as erecting supports, mounting signs and when necessary, removing damaged materials. Also includes the costs of flasher lights attached to barricades and signs and the placement and repair of all barricades. All contract construction projects includes construction, detour and other temporary signing as part of the contract and as such all costs for signing should be included with the contract.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew cab	4.5 sites	Appropriate
2	Equipment operators	1	High lift truck	per hr	signs
1	Non-Operator	1	Truck with post		
1	Non-Oper. (Safety)		driver		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	4.5 Sites/Hr.	300 Feet/Day

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7622-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Signs Delineators, Hazard Markers	1.78 Sites/Man Hr

Assembly Description Summary

This assembly includes all actions related to the erection, maintenance, and removal of delineators and hazard markers. This includes costs of erecting supports, mounting sign, and when necessary removing damaged material. Also charge the placing of paint pattern markers to this assembly.

Sites are number of delineator and hazard marker installations serviced.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 1 1	Foreman Equipment operators Non-Operator	1 1	Crew Cab Truck with post driver	6 site per hr.	Appropriate signs

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	6 Sites/Hr.	40 Sites/Day

Method and Procedure:

Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7623-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Signs Sign Reviews	None Established

Assembly Description Summary
This assembly includes all actions related to the review of signs in the field for purposes of determining maintenance needs and the associated actions to document these needs and generate a work schedule.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 1	Foreman Non-Operator	1	Crew Cab		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Miles Code 8	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7624-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Signs Repair/Replace Permanent Signs Under 16 Sq. Ft.	.67 Site/Man Hr.

Assembly Description Summary

This assembly includes all actions related to the erection, maintenance and removal of permanent signs under 16 square feet not provided for in assemblies 713-7621 and 713-7622. Includes costs such as erection supports, mounting signs, and when necessary, removing damaged material.

Site is one individual installation regardless of the number of individual signs. If total sign area of multiple signs is over 16 sq. ft. charge assembly 713-7624-02.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 1 1	Foreman Equipment Operator Non-Operator	1 1 1	Crew Cab Portable power supply and tools Mustang or highlift (if needed) Hand Tools	As Required	Posts and Signs All fastenings as required per specs.

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	2.5 Sites/Hr.	15 Sites/Day

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7624-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Signs Repair/Replace Permanent Signs 16 Sq. Ft. and over	.20 Site/Man Hr.

Assembly Description Summary

This assembly includes all actions related to the erection, maintenance and removal of permanent signs 16 sq. ft. and over not provided for in assemblies 713-7621 and 713-7622. Includes costs such as erecting supports, mounting signs and when necessary, removing damaged material.

Overhead and interstate signs are included in this assembly.

Site is one individual installation regardless of the number of individual signs.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 1 2	Foreman Equipment Operator Non-Operator	1 1 1	Crew Cab Portable power supply and tools Mustang or highlift Hand Tools	As Required	Posts, Signs and Fasteners

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	.8 Site/Hr.	6 Sites/Day

Method and Procedure:

Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7625-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Signs SR and Segment Markers	None Established

Assembly Description Summary

This assembly includes all actions related to the erection, maintenance and removal of SR and Segment Markers.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
1 1 1	Foreman Equipment Operator Non-Operator	1 1	Crew Cab Portable Power Supply and Tools Hand Tools	As Required	Posts, Signs All fastenings as required per specs.

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Site Code 9	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7629-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Signs Other	None Established

Assembly Description Summary

This assembly includes all actions related to any miscellaneous sign activity which cannot be properly charged to one of the previous sign codes, such as mechanical post straightening with the straightener, sign cleaning and brushing to improve sight distance of signs.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7631-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Guiderail Repair/Replace - Cable Mechanized	1.17 Ft./Man Hr

Assembly Description Summary
This assembly includes all actions related to the repair and/or replacement of damaged or worn guiderail cable, posts, cable fittings, etc.

This assembly includes extension or installation of any guiderail for less than 500 continuous feet. In excess of 500 continuous feet, must be programmed and charged to Cost Function 9808 under Program 381. Do not include reimbursable costs or damages to guiderail by outside parties. Such costs are to be charged to cost function 2531 under Program 612.

Current policy is to replace wood posts with galvanized steel posts. All counties should consider developing a planned approach to upgrade all wooden post cable rail to W-Beam railing.

Current standard is three strands. If a 4 strand fence requires repair or replacement the third strand from the top may be removed and salvaged for future use.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 2 2 1	Foreman Equipment Operators Non-Operators Non-Oper. (Safety)	1 1 1 1	Crew Cab Post Driver Dump Truck Come-Along Hoist and Tripod	As Required	Posts, brackets, splices, salvage and reuse as much material as possible

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet Code 4	75 Feet/Hr.	525 Feet/Day

Method and Procedure:
The work for the day will usually start where materials are stocked whether it is at the county yard, an annex, or tool box. If a great deal of work is required in a local area, it may be advantageous to set up a temporary stockpile at the nearest tool box.

The foreman should know his material requirements based on his prior survey. The crew will then check the supply trailer and get whatever is required for the day. (If the requirement exceeds the capacity of the trailer, a dump truck should be temporarily added to the crew to haul good material and remove scrap and salvage). Attach the trailer to the crew cab tow hitch and make all electrical connections.

The foreman shall also have arranged for the additional Non-Oper. and equipment required for traffic control. When all of the crew is assembled the foreman shall give his daily safety talk and general instructions concerning work for the day.

At the work site foreman and crew place the traffic control equipment as required in Pub. #213. Crew dismantles all fence in the damaged area, setting aside all good material for immediate reuse and the remainder for salvage or scrap. Using the come-along tripod remove all posts which are damaged beyond reuse.

Replace the removed posts with general purpose galvanized steel posts. Drive the posts using the post driver.

Mount spring offset brackets on posts then cables to brackets. If no spring brackets are used then mount cable to posts with cast brackets and hook bolts.

If a cable strand has been broken cut off the torn ends and splice in an equivalent length using cable splices.

Check and make necessary repairs to end posts, anchor rods, and turnbuckles.

Adjust cable tension using turnbuckles.

Cleanup area.

Travel to next work site and repeat procedure as above.

At end of day pick up traffic control signs and travel back to assembly point.

Unload damaged material and sort for: 1) scrap, 2) salvage and rework, 3) use as is.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7631-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Guiderail Repair/Replace – W-Beam Mechanized	5.70 Ft./Man Hr

Assembly Description Summary
This assembly includes all actions related to the repair and/or replacement of damaged or worn W-beam panels, posts, fittings, etc.

This assembly includes extension or installation of any W-beam guiderail for less than 500 continuous feet. In excess of 500 continuous feet, must be programmed and charged to Cost Function 9808 under Program 381. Do not include reimbursable costs or damages to guiderail by outside parties. Such costs are to be charged to cost function 2531 under Program 612.

This standard applies to guide fence with steel W-beam on 6B8.5 or 6B8.5 or "C" shape 5.875 steel posts. The post spacing is either 12' - 6" or 6' - 3". Weak post guide fence using S3 x 5.7 or "C" shape 3.375 steel posts may also be repaired under this assembly number. All damaged components shall be removed unless they can be readily repaired on the job. The Department's rail runner can rework many of the damaged beams.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab	As	W-rails,
1	Post Driver Operator	1	Post Driver	Required	brackets
1	Equipment Operator	1	Dump Truck		
3	Non-Operator		Hand Tools		Steel posts
1	Non-Opers. (Safety)		Wrenches		
			Pry Bars		Hardware
			Digging Bars		(As much material as possible shall be reused or reclaimed)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet Code 4	45 Feet/Hr.	300 Feet/Day

Method and Procedure;
The work for the day will usually start where materials are stocked whether it is at the county yard, an annex, or tool box. When the crew will be working in an area for a lengthy period, it may be an advantage to set up a temporary stockpile at the nearest tool box.

Based on previous surveys, the foreman should know the material requirements for the day. The crew will check the supply trailer and make up any shortages from the stockpile. (If the requirement exceeds the capacity of the trailer, a dump truck should be temporarily added to the crew to haul good material to the job and haul away salvage and scrap).

Yard preparation includes giving all equipment its general servicing as required. Either at the stored location or the county yard, refuel, load hand tools, traffic control equipment, etc.

All of the crew travels to the first work site setting up traffic control equipment as required in Pub. #213. When all of the crew is assembled the foreman gives instructions concerning safety and work for the day.

At the worksite the regular crew will dismantle all fence in the damaged area. They will sort all good material for immediate reuse and the remainder for salvage or scrap. Using the post driver remove all posts which are damaged beyond reuse. Straighten and twist reusable posts using the post driver plus the twisting bar.

Replace the removed posts with general purpose galvanized steel posts. Drive the post using the post driver.

Mount offset brackets on posts. Turn nuts to hand tight.

Assemble replacement (new or salvage) W-beams to brackets. Overlap the beams so the end of beam is not visible from the direction of travel. Hand tighten all bolts and nuts until all of the section is replaced. Then final tighten with tools.

Cleanup area. Load all unused material on supply trailer, crew cab, or truck.

Travel to next worksite. Relocate traffic control equipment unless next work area is in the same control zone.

At end of day pick up traffic control equipment and travel back to assembly point. Unload damaged material and sort for: 1) scrap, 2) salvage and rework, 3) use as is.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7631-03
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Guiderail Repair/Replace Manual	None Established

Assembly Description Summary
This assembly includes all manual actions related to the repair/replacement of all types of guiderail. Refer to assembly 713-7631-01 and 02.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet Code 4	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7631-04
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Guiderail Upgrade Remove Cable/Replace with W-Beam Mechanized	None Established

Assembly Description Summary

This assembly includes all actions related to removing cable guiderail and replacing it with W-Beam Guiderail. Work zone traffic control shall be set up in accordance with Pub# 213.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet Code 4	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7632-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Guiderail Removal Mechanized	None Established

Assembly Description Summary
This assembly includes all actions related to the permanent removal of unneeded guiderail. It does not include removal time when guiderail is going to be replaced or updated, this time is charged to assembly 713-7631-02.

Guiderail should only be used where the results of striking the object or leaving the roadway would be more severe than striking the guiderail. All roadways should be examined to determine the feasibility of adjusting site features so that guiderail will not be required (i.e. flattening a slope, removing a tree, eliminating a headwall, etc.). Refer to (Pub. #13) Design Manual, Part II, Chaper 12 for specific details on guiderail requirements.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab		Not Required
1	Equip. Operator	1	Post Driver		
1	Non-Operator	1	Dump Truck		
1	Non-Oper's. (Safety)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet Code 4	None Established	None Established

Method and Procedure:
Refer to assembly 713-7631-01 & 02 for specific details on removal procedures.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7632-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Guiderail Removal – Department Forec Contractor Installed	None Established

Assembly Description Summary
This assembly includes all actions related to removal of guiderail by department forces where the guiderail is to be installed by contract. The contract installation should be charged to the appropriate assembly.

Guiderail should only be used where the results of striking the object or leaving the roadway would be more severe than striking the guiderail. All roadway should be examined to determine the feasibility of adjusting site features so that guiderail will not be required (i.e. flattening a slope, removing a tree, eliminating a heasdwall, etc.). Refer to Pub. #13 (Design Manual), Part II, Chapter 12 for specific details on guiderail requirements.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab		Not Required
1	Equip. Operator	1	Dump Truck		
1	Non-Operator	1	Post Driver		
1	Non-Oper's. (Safety)				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Feet Code 4	None Established	None Established

Method and Procedure:
Refer to assembly 713-7631-01 & 02 for specific details on removal procedures.

Prior to the beginning of work, the foreman shall give the required safety talk and provide general instructions to the work crew on the day's assemblies.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7639-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Median Barrier/Guiderail and Impact Attenuation Devices Other	None Established

Assembly Description Summary

This assembly includes all actions related to miscellaneous median barrier, guiderail and impact attenuation devices assemblies which cannot be properly charged to one of the above codes, such as painting, cable adjustment, loading and transporting of new guiderail for storage, mechanized straightening of rails with post straightener, all repair/replacement of end treatments associated with bridges, repair/replacement of impact attenuation devices, etc.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7671-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Lighting Servicing Highway, Bridge and Sign Lighting Systems	None Established

Assembly Description Summary

This assembly includes all actions related to the servicing and maintenance of highway, bridge sign, and navigation lighting systems by Department employes and outside contractors. These costs include replacement of lamps and testing, trouble shooting and repairs, cleaning, electrical power to operate said systems, etc. Flasher lights attached to permanent signs should be charged to assembly 713-7621-CONSTRUCTION DETOUR AND OTHER TEMPORARY SIGNS.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7681-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Traffic Services Sweeping	None Established

Assembly Description Summary

This assembly includes all actions related to sweeping of curbs and gutters on streets and/or highways such as sweeping and disposal of material. This Cost Function should be used only when the sweeping is not part of the performance standard for a specific assembly. The spring cleanup of anti-skid material is an example of an action which would be reported under this assembly.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	As Required		As Required		No Materials Required

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7682-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Traffic Services Deer Removal	None Established

Assembly Description Summary
This assembly includes all actions related to the removal of DEER CARCASSES ONLY. All other animal removal will be chagred to assembly 713-7689-01 'Traffic - Incidental Service – Other'.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Each Code H	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 713-7683-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Traffic Services Homeland Security	None Established

Assembly Description Summary
This assembly includes all actions required for 'Homeland Security' such as heightened security level actions, bridge security measures, etc.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 713-7689-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Traffic Services Incidental Services Other	None Established

Assembly Description Summary

This assembly includes all actions related to any miscellaneous incidental service assemblies, such as dead animal removals (except deer removal), right of way fence maintenance, etc.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	**Classification**	**Number**	**Type**	**Amount**	**Description**
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7711-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Mowing – Rotary, Flair or Cycle Bar Manual	.17 Acres/Man Hr

Assembly Description Summary
This assembly includes all actions related to manual roadside mowing assemblies such as mowing with power driven type mower(s), sickle, scythe or other hand tools.

This assembly is normally performed at intersections where small traffic islands exist, or at other similar areas where larger power mowers cannot operate efficiently. This assembly should not be necessary under guiderail, around delineators and signs as the non-selective herbicide program under assembly 714-7712-01 is designed to accomplish this vegetation control.

Supervision, inspection, minor equipment and tool repair or maintenance at the job site and the removal of mowing obstructions are also included.

This assembly is performed May 1 through October 1 as required.

Production units are measured in acres of land area mowed

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 3	Foreman Non-Operators	1 3	Crew Cab Hand Type Mowers, Sickles, Scythe, Other hand tools		No material required

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Acre Code 1	.83 Acres/Hr	5 Acres/Day

Method and Procedure:

1. Yard preparation includes loading daily supply of fuel for mower(s), checking mower blades for loose or for defective parts, transporting mower(s) and servicing of foreman's crew cab (fuel and oil check).

2. Accessory tools may include grass rakes, grass shears and litter bags to collect excessive clippings or litter.

3. Grass should preferably be dry when cut to allow proper dispersal of clippings so that no pickup of clippings is required. "Police" the area to be mowed and pickup and dispose of litter and debris before mowing begins.

4. Grass should be cut when 6" in height and should be cut to a height of not less than 3".

5. Particular care must be taken to avoid injury to desirable trees and shrubs.

6. At conclusion of days work, clean clippings from underside of mower and recheck for mower damages.

7. Summarize daily accomplishments, in acres, on ID-65TC, Crew Daily Project Time Record.

   Refer to Table 1.1 or 1.2 of Chapter 9 in Foreman's Manual for acreage determination.

8. Personnel Safety – never place hands near mower blades unless the spark plug wire has been disconnected. When operating rotary mowers make sure that other workers and the public will not walk in the path of material discharged from the mower. All mowing, either by hand power mowers, by sickle or scythe must be performed with due respect for fellow workers in the immediate areas – keep safe Spacing between workers. Publication 213 (work area traffic control) procedures are required.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7711-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Control Mowing – Rotary, Flair or Cycle Bar Mechanized	.80 Acres/Man Hr

Assembly Description Summary
This assembly includes all actions related to mechanized roadside mowing assemblies including mow-line establishment, mowing, supervision or inspection, removing litter and mowing obstructions.

This assembly is performed in medians, interchanges and along the roadway to control the height of growth of grass and for the purpose of preventing the growth and spread of prohibited weeds and other undesirable plant growth. The degree of mowing intensity to attain acceptable vegetative control is the coordinated responsibility of the District Roadside Specialist and the County Maintenance Manager.

Supervision, inspection, minor equipment repair or maintenance at the job site is also included.

This assembly is performed May 1 through October 1, as required to maintain the height of growth as specified in Chapter 13 of the Maintenance Manual, Publication 23.

Production unit is measured in Acres of land area mowed.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Equipment Operator	1 1	Tractor Mower - Rotary, Flail or Bar or Combination		No material required

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Acre Code 1	1 Acre/Hr.	6 Acres/Day

Method and Procedure:

1. Yard preparation includes servicing equipment and sharpening blades or knives as required.

2. Mowing operations are to be performed as programmed and this programming must be coordinated with the herbicide applications for maximum value of both assemblies. The District Roadside Specialist should be consulted.

3. All interchanges must have the limits of mowing, as determined by the District Roadside Specialist, monumented by 3' high Mow-Line markers and no mowing is to be performed behind these markers. Mainline mowing along uncurbed multi-lane always is to be performed to the limits indicated below.

4. Along uncurbed two lane highways normal widths are from shoulder to ditch line and one cutter bar width up cut slopes unless Crownvetch covers the slope to the ditch line, in which case mow only to ditch line.

5. Summarize daily accomplishments, in acres on ID65TC, Daily Project Time Record and enter route and segments in project line. Refer to Table 1.1 or 1.2 of Chapter 9 in Foreman's Manual for acreage determination.

6. Personnel Safety – All mowing equipment should move with the flow of traffic. Any procedures to the contrary should be sanctioned by the County Maintenance Manager. Publication 213 requirements are in effect. Do not mow on slopes steeper than 3:1, or where area is wet and equipment may get stuck, slide and/or upset. Do not mow over or through debris which can be thrown into traffic, or people, or which may damage equipment.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7711-03
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Mowing – Chemical, Plant Growth Regulators (PGR's) Mechanized	1.33 Acres/Man Hr

Assembly Description Summary

This assembly includes all actions related to the application of plant growth regulators for the purpose of inhibiting seedhead formation and reducing mechanical cutting frequencies. Also included in this application is the use of a herbicide for the control of broadleaf weeds. This assembly is recommended primarily for turf areas requiring frequent cutting and traffic islands or other plots that require manual mowing. Treatment needs should be planned in conjunction with the annual work plan and programmed on the county mowing maps. This assembly should be performed between March 15 and May 15 depending on geographic location, weather conditions and growth rate and condition of the grass. The applications should be made when the grass is actively growing and has a good green color. The optimum condition is to have a turf height of 4" to 6" with seedheads still within the sheath. If seedheads have emerged or grass is taller than desired, the areas should be mowed and treated 5 to 7 days after the mowing.

It is suggested that a fall mowing be done on all areas where growth regulators are scheduled for the following spring. This should provide a healthier turf condition and uniformity in the early spring growth.

PGR's should not be used on grasses which are under stress from drought, insects or disease or when turf is less than one year old.

The applications must be made by a certified pesticide applicator, a trained application technician or any other person provided by a certified pesticide applicator is present at the work site.

The costs of supervision and department inspection of all contract applications are credited to this program. Also, the costs of department equipment including minor job site repairs are charged to this operation.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
			DEPARTMENT FORCES APPLICATION		
1	Operator	1	Spray Truck (1000 Gallon)	As Required	Selective Herbicide
1	Applicator (Sprayer)				
			CONTRACT APPLICATION		
1	Inspector		Contract herbicide applicator	As Required	Selective Herbicide

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Acre Code 1	3.3 Acres/Hr.	20 Acres/Day

Method and Procedure:

1. Yard preparation includes servicing truck and spraying equipment, the filling of the sprayer with water and chemical, if the treatment areas are near the yard. Also, load sufficient materials on the truck to accomplish the planned daily program.

2. The sprayer must be calibrated each time a growth regulator is to be applied. The District Roadside Specialist should be present or have provided specific guidelines for the calibration. Proper application is extremely critical in that some of the growth regulator rates per acre are so low (fractions of an ounce), that there is little or no margin for error. ALL APPLICATIONS MUST BE MADE WITHIN THE PRODUCT LABELED RATES.

3. A pre-determined schedule of operation should be prepared from the program map in order to avoid dead heading.

4. It is recommended that the application be made utilizing the appropriate nozzles or system that will provide a consistently even pattern with no overlapping.

   Do not spray if there is enough breeze to disturb the spray pattern. Do not spray when showers are imminent or when rain is intermittent.

5. Record routes and limiting segments for each day on the proper document as shown below. In addition to the standard information required on the forms, the following data must be recorded – Acreage treated, type of material used, percent solution and rate per acre.

   Contract spraying – use Form 609 and M-65CS

   Department forces – use 65C

6. Follow safety instructions on the label when mixing and applying growth regulators. Keep eye wash syringe ready and available at all times. When refilling the spray tank from a body of water, keep the discharge end of the hose out of the water in the tank to prevent siphoning into the water source.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 714-7712-01
		EFFECTIVE DATE July 1, 2014
ASSEMBLY Vegetation Management Herb Application – Non Selective Mechanized		**PERFORMANCE STANDARD** .13 Acres/Man Hr

Assembly Description Summary

This assembly includes all actions related to the application of non-selective (residual) herbicides including glyphosate (Roundup), which are utilized to control or eradicate all vegetation growing in concrete divisors, under guide fence, around delineator and sign posts and similar areas where bare ground is desirable and soil erosion will be no problem.

It is necessary that this activity be well coordinated with winter abrasive removal and shoulder grading/side dozing operations. This herbicide treatment is useless if after application the abrasives and shoulder materials, which contain the herbicide, are removed exposing untreated areas.

Supervision and department inspection of all contract applications are costs credited to this program as are costs of minor department equipment repairs at the job site.

Except for glyphosate, which can be applied from June through August, best results with non-selective herbicides are obtained when applications are made by June 1.

It is both labor and cost effective to utilize glyphosate for the control of weeds and grass in shrub beds, around the base of trees and for controlling grass and weed invasion along sidewalks, curbs and driveways which border established lawn areas.

The applications must be made by a certified pesticide applicator, a trained application technician or any other person provided a certified pesticide applicator is present at the work site.

Production units are measured in acres of land area treated.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
			DEPT. FORCES APP.		
1 1	Applicator Equipment Operator	1	Spray Truck (1000 Gallon)	As Required	Residual (Non-Selective Herbicide)
			CONTRACT APP.		
1	Inspector	1	Contract herbicide applicator	As Required	Residual (Non-Selective Herbicide)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Acre Code 1	3.3 Acres/Hr.	20 Acres/Day

Method and Procedure:

1. Yard preparation includes servicing truck and spraying equipment, the filling of the sprayer with water and herbicide material, if the treatment areas are near the yard, and loading sufficient herbicide material on the truck to accomplish the planned daily program.

   Accessory tools should include replacement nozzles, a 10" crescent and 12" pipe wrench, a five gallon bucket for pre-mixing wettable powder herbicides and other incidental tools required to keep the activity on schedule.

2. If the sprayer has not been calibrated previous to the start of this program, it must be calibrated in the presence of the District Roadside Specialist to assure his specified application rate. The application technique and frequency for recalibrating will be determined at this time. All applications must be made within the product labeled rates.

3. Proceed to the route to be treated as programmed on the county map. Pre-determine your schedule to reduce dead heading. Pick up additional water at convenient locations as needed and meet the traffic protection requirements of Work Zone Traffic Control (Pub #213).

4. For treating the 2 foot wide area under the guard fence, the concrete divisor joints and delineator and sign post areas a hand held 5’ – 6’ wand fitted with two 8015 tips, held 18” off the target area, provides good application and is recommended.

   Always utilize low pump pressure in this activity; to avoid any fogging, small droplet size, or off-target splash.

   For glyphosate applications to shoulder areas the appropriate off center nozzle or conventional spray boom with fan type nozzles will provide the most uniform application.

   Extreme caution must be exercised when applying non-selective herbicides to areas wider than 2 feet as concentration of materials can accumulate in drainage water and kill desirable vegetation.

   For glyphosate applications around shrubs, trees and borders, the 3-5 gallon knap-sack sprayer works best.

5. The M-609 (Roadside Activity Report) must be completed for this activity. Utilize the table on the reverse to determine acres of treatment. On new County map, color code daily, all routes completed.

   Complete Form C-65C for Department force charges

   Complete Form M-65CS for Contract application.

6. Personnel Safety – follow labeled instructions when mixing and applying herbicides. Wear required protective garments and do not breath fumes or dust of the herbicide concentrate when missing.

   Keep the eyewash syringe filled with clean water and readily available

   Place spray gun, when not in use, in proper holder or rack to prevent accidentally bumping trigger and discharging spray material. When refilling spray equipment from a body of water, keep the discharge end of the hose out of the water in the tank to prevent siphoning herbicide into the water source.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7713-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Herbicide Application Broadcast Foliage	1.33 Acres/Man Hr

Assembly Description Summary

This assembly includes all actions related to the application of selective herbicides, for the control of undesirable weeds and woody plant growth in lawn and roadside areas. Herbicides for this activity are selective in their effects on various plants when used in accordance with label directions. Various chemicals are used in the performance of this function and are also incorporated with PGR's in the chemical mowing (Assembly 714-7711-03).

It is necessary to coordinate this activity with the mowing schedule and the roadside brushing activities. Through timely applications of the selective herbicides turf areas will be improved in appearance, roadside weeds and brush will be controlled and maintenance costs reduced.

Supervision and department inspection of all contract applications are costs credited to this program as are costs of minor department equipment repairs at the job site.

Weed and brush control applications produce the best results when applied to the foliage of plants between June 1 and July 15.

The applications must be made by a certified pesticide applicator, a trained application technician or any other person provided a certified pesticide applicator is present at the work site.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Production units are measured in acres of land area treated.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Operator	1	DEPT. FORCES APP. Spray Truck	As Required	Selective Herbicide
1	Applicator (Sprayer)		(1000 Gallon)		
1	Inspector	1	CONTRACT APP. Contract herbicide applicator	As Required	Selective Herbicide

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Acre Code 1	3.3 Acres/Hr.	20 Acres/Day

Method and Procedure:

1. Yard preparation includes servicing truck and spraying equipment, the filling of the sprayer with water and herbicide material, if the treatment areas are near the yard, and loading sufficient herbicide material on the truck to accomplish the planned daily program.

   Accessory tools should include an assortment of replacement nozzles, a 10" crescent and 12" pipe wrench and other incidental tools required to keep the activity on schedule.

2. If the sprayer has not been calibrated previous to the start of this program, it must be calibrated in the presence of the District Roadside Specialist to assure his specified application rate. The application technique and frequency for recalibrating will be determined at this time. All applications must be made within the product labeled rates.

3. Proceed to the route to be treated as programmed on the county map. Pre-determine your schedule to reduce dead heading. Pick up additional water at convenient locations as needed and meet the traffic protection requirements of Publication #213.

4. The maximum height of the spray pattern shall not exceed 4' above the ground. Higher spray patterns create unsightly brown foliage and encourage environmental complaints.

   Applications should be made utilizing the appropriate nozzles or system, that will provide a consistently even pattern. The vehicle speed should not exceed 12 mph, and all undesirable plant foliage treated to the point of run off. Spray pump pressure should be adjusted to provide large droplet size, therefore preventing fogging, misting and off-target damage by drifting.

   Do not spray when wind is blowing debris around. Move operation to protected highway sections in rural forested or other protected areas. Treat normally windy areas early in the morning when no wind exists.

   Do not spray when rain is intermittent. If rain occurs within two hours after treatment retreat the areas.

5. The M-609 (Roadside Activity Report) must be completed for this activity. Utilize the table on the reverse to determine acres of treatment. On new county map, color code daily, on all routes completed.

   Complete Form C-65C for department force charges.

   Complete Form M-65CS for contract applications.

6. Personnel Safety: follow labeled instructions when mixing and applying herbicides. Wear required protective garments and do not breathe fumes or dust of the herbicide concentrate when mixing.

   Keep the eye wash syringe filled with clean water and readily available.

   Place spray gun, when not in use, in proper holder or rack to prevent accidentally bumping trigger and discharging spray material.

   When refilling spray equipment from a body of water, keep the discharge end of the hose out of the water in the tank to prevent siphoning herbicide into the water source.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	**BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD**	**ASSEMBLY NUMBER** 714-7714-01 **EFFECTIVE DATE** July 1, 2014

ASSEMBLY	**PERFORMANCE STANDARD**
Vegetation Management Herbicide Application Broadcast Chemical Trimming (Fosamine)	.67 Acres/Man Hr

Assembly Description Summary

This assembly includes all actions related to the application of selective herbicides, for the control of undesirable woody growth or part thereof. This assembly utilizes fosamine (Krenite) for foliage applications made with power sprayers. It is necessary to coordinate this fosamine foliage program with roadside brushing activities so that treated vegetation is not cut or removed before full advantage of the herbicide application is realized. The timely application of fosamine will not create brown foliage, but will control the development of foliage in the succeeding year and ultimately kill the treated portions of sprayed woody growth. Fosamine application should be made (during August and September).

Supervision and department inspection of all contract applications are costs credited to this program as are costs of minor department equipment repairs at the job site.

The applications must be made by a certified pesticide applicator, a trained application technician or any other person provided a certified pesticide applicator is present at the work site.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Production units are measured in acres of land area treated. To standardize reporting - use the factor of 100 gallons solution equals 1 acre of production.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
		1	DEPT. FORCES APP.	As Required	Selective
1	Applicator Equipment Operator		Spray Truck		Growth Regulator (Fosamine)
1	Inspector		CONTRACT APP.		
			Contract herbicide applicator	As Required	Selective Growth Regulator (Fosamine)

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Acre Code 1	1.7 Acre/Hr.	10 Acres/Day

Method and Procedure:

1. Yard preparation includes servicing truck and spraying equipment, the filling of the sprayer with water and herbicide material, if the treatment areas are near the yard, and loading sufficient herbicide material on the truck to accomplish the planned daily program.

   Accessory tools should include an assortment of replacement nozzles, a 10" crescent and 12" pipe wrench and other incidental tools required to keep this activity on schedule.

2. If the sprayer has not been calibrated previous to the start of the program, it must be calibrated in the presence of the District Roadside Specialist to assure his specified application rate. The application technique and frequency for recalibrating will be determined at this time. All applications must be made within the product labeled rates.

3. Proceed to the route to be treated as programmed on the county maps. Pre-determine your schedule to reduce dead heading. Pick up additional water at convenient locations as needed and meet the traffic protection requirements of Publication #213.

4. Fosamine, trademarked Krenite S., contains surfactant as packaged and is to be utilized in ground application equipment for brush and tree growth control. Mix ratio shall be 6 to 8 quarts of fosamine per 100 gallons of water (1 to 2 percent solution). Apply at an approximate 100 gallons of solution per acre, thoroughly and uniformly covering the target brush AVOIDING UNNECESSARY RUN-OFF. The equipment utilized in this operation should be capable of pressures and volume that will penetrate up to 8 ft. into dense foliage conditions. The spray rig should maintain a constant speed which shall be determined by calibration, but should NOT BE IN EXCESS OF 10 MPH.

   A hand gun should be available for use as and when the condition dictates.

5. The M-609 (Roadside Activity Report) must be completed for this activity. Utilize the table on the reverse to determine acres of treatment. On new county maps, color code daily, on all routes completed.

Complete Form C-65C for department force charges. Complete Form M-65CS for contract applications.

6. Personnel Safety: Follow labeled instructions when mixing and applying herbicides. Wear required protective garments and do not breathe flumes or dust of the herbicide concentrate when mixing.

   Keep the eye wash syringe filled with clean water and readily available.

   Place spray gun, when not in use, in proper holder or rack to prevent accidentally bumping trigger and discharging spray material). When refilling spray equipment from a body of water, keep the discharge end of the hose out of the water in the tank to prevent siphoning herbicide into the water source.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7715-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Brushing, Selective Thinning Tree Removal and Tree Trimming	None Estabilished

Assembly Description Summary

This asembly includes all actions related to tree trimming, brushing, selective thinning and tree removal using the appropriate power and hand tools; and the removal of stumps where required. Also included in this assembly is the herbicide treatment of all cut stumps where removal or grubbing is not scheduled. This includes securing "Authorization to Enter" (Form RW397A), for any off right-of-way work; the disposal of resulting brush and the placing of all usable wood products onto adjacent private property, unless objected to by the owner.

This assembly is performed at anytime of the year with an increased emphasis in late fall and thru the winter season.

Chapter 13, Section 5 of the Maintenance Manual should be reviewed before undertaking this activity for legal and operational policy guidance.

Trees within the legal right-of-way which pose a hazard to adjacent properties, utilities, traffic or department personnel during removal of operations, must be scheduled for prompt removal by professional contract tree experts.

Where the cutting or trimming of trees, on or off right-of-way will, in the opinion of the engineer cause an adverse affect on the residence of the property owner, all reasonable attempts to contact the owner must be made. Where required, the "Authorization to Enter" form must also be obtained.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Carbon (only Aquashicola Creek Watershed), Chester, Cumberland, Delaware, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (only Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with thick mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Publication 546, Threatened and Endangered Species Desk Reference for standard operating procedures for the avoidance of adverse effects to the bog turtle.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Crew Cab		
1	Equipment Operator	1	Dump Truck		
	(Truck & Chipper)	1	Wood Chipper		
3 or 4	Non - Operator	1 or 2	Chain Saws Hand Tools: Pole Saw, Hand saw, Pole Pruner, Lopping Shears, Ropes, Ladder, Broom, Scoop Shovel, Files, Cones, Axes, Knapsack		
1	Foreman	1	Sprayer		
1	Equipment Operator	1	STUMP REMOVAL		
1	Non-Operator		Stump Cutter		
			Crew Cab		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours 7	None Estabilished	None Estabilished

Method and Procedure:

1. Yard preparation includes fuel and oil checks for foreman's crew cab, dump truck, and wood chipper. Load tools, adequate supply of gas-oil mixture for chain saw(s) and daily support of pre-mixed oil-herbicide for stump treatment as per manufacturer's recommendation.

2. Brushing, trimming and tree removal operations are to be performed as per the annual work plan. This programming must be coordinated with the fosamine herbicide application to permit the maximum efficiency from the herbicide treatment. (See county herbicide map). Where emergency conditions exist, the county manager and district roadside specialist should determine the needed response and/or the possible engagement of the contract tree expert crew.

3. Trimming should be done in accordance with good arboricultural and silvicultural practices, with undesirable tree modifications, avoided wherever possible. When conditions dictate this type of trimming, complete removal is recommended where property owners do not object.

   Except where grubbing or stump removal is planned, apply an oil-herbicide mixture to the cut surface of all live stumps, including root collar and exposed roots, immediately after cuts have been made. When applying herbicides, always follow precautions for personal safety as outlined on manufacturer's label.

4. Wood should be cut into lengths of not less than two feet. Usable log lengths are desirable if property owner removes promptly from the right-of-way, otherwise lengths suitable for economic handling should be selected.

5. Record routes and limiting segment numbers of each day's work, estimated acreage completed (using chart on reverse side of Form M-609), and name of herbicide and amount of oil-herbicide mixture used. Record this information on Form M-609, Roadside Activity Report when performing work by Service Purchase Contract.

For department force work, enter appropriate information on Form 65-C, Daily Project Time Record.

6. Stump removal is performed by a contract or rental agreement where specific locations dictates this removal. The contractor is responsible for all equipment, safety and traffic control required. The area highway foreman is responsible for this activity and work reporting unless otherwise arranged. The M-65CS Record or Production by contract services must be completed for this work.

7. Personnel Safety-Traffic Control for all brushing, tree trimming, tree removal and selective thinning is to be conducted as required by Publication #213 Operators of power cutting tools shall be trained in their usage and must be properly clothed to prevent garments from becoming entangled in the equipment. Gloves, eye shields, hard toed safety shoes and other protective accessories are minor requirements. Cutting tools such as axes, saws, etc., must be used with extreme care when working near fellow workers particularly during wet, snowy or inclement weather conditions.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7715-02
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Brushing, Tree Trimming and Tree Removal Mechanical	None Estabilished

Assembly Description Summary
This assembly includes all methods and procedures described under assembly 714-7715-01 except that the performance is accomplished either by the use of hydraulic tools, boom arm mowers or trimmerlift equipment.

If this assembly is proposed within the counties of Adams, Berks, Bucks, Chester, Cumberland, Delaware, Franklin, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton, Schuylkill (Swatara Creek Watershed), or York, then this activity must avoid adverse impacts to the bog turtle. The bog turtle is a federally threatened, and state endangered species protected by applicable laws. Potential habitat for the species is typically characterized by wetlands with deep mucky soils and groundwater springs. If wetlands or watercourses are present within the disturbance area for this assembly, then special provisions and/or time of year restrictions may be necessary. Coordinate with the District Project Manager and District Environmental staff. Refer to Department Standard Operating Procedures for The Avoidance Of Adverse Effects To The Bog Turtle By Transportation Projects.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Foreman	1	Pickup	As	Herbicides for
1-2	Equipment		Hand Tools	Required	Stump Treatment
4	Operator(s)	1	Wood Chipper		
	Non-Operators	1 or 2	Chain Saws		
		1	Trimmerlift on Truck		
			or		
		1	Boom Arm Mower		
			or		
		1	Set of Hydraulic Trimming Tools		

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours 7	None Estabilished	None Estabilished

Method and Procedure:

1. Yard preparation includes fuel and oil checks for foreman's crew cab, dump truck, wood chipper, mower or other equipment needed for the operation. Assure that cutting equipment is sharpened and serviceable. Calibrate hydraulic tools with the hydraulic system utilized in the operation.

   Load tools, adequate supply of gas-oil mixture for chain saw(s), and a daily supply of herbicide for stump treatment as per manufacturer's recommendation.

   ALL OTHER OPERATING PROCEDURES SHALL BE IN ACCORDANCE WITH THOSE DESCRIBED UNDER ASSEMBLY 714-7715-01 EXCEPT AS FOLLOWS:

   Where dense stands of saplings 3" and smaller are cut with the boom arm mowers, stump treatment is not required, providing the areas are programmed for assembly 714-7713-01 treatment during the ensuing spraying season.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7715-03
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Herbicide – Basal Bark and Dormant Stem	None Estabilished

Assembly Description Summary

This assembly includes all actions related to the elimination of unwanted woody plants through the application of herbicides using either one of two methods-basal bark or dormant stem. Although the basal bark method may be applied at anytime of the year, for highway purposes it is also most adaptable to the dormant season.

Dormant stem applications are most effective in the control of thick stands of saplings generally less than 3" in diameter, or where clumps of saplings are located adjacent to croplands. The basal bark method is suggested for areas inaccessible to equipment, or where selective thinning is desired. Both methods, when applied during the dormant season, prevent the unsightly negative effective of brownout. This method is not recommended for locations near the highway where the height of unwanted trees would be such that the dead stems would fall onto the roadway. In these situations the suggested method would be removal and cut stump treatment (method 01 or 02).

Follow label directions for rates and application techniques. Also refer to the Roadside Vegetation Management Manual for additional information.

The applications must be made by a certified pesticide applicator, or a trained application technician, or by any other person provided a certified pesticide applicator is present at the work site.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
			DEPARTMENT FORCES		
1	Equipment Operator	1	Spray Truck	As	Appropriate
1	Applicator (Sprayer)		(1000 gal.)	Required	herbicide &
1	Inspector				prescribed
			CHAPTER 6	As	carrier
			CONTRACT	Required	Same as above
1	Foreman	1	Contract Applicator		
1 or more	Applicators	1 or more	MANUAL APPLICATION Pickup Hand sprayers	As Required	Same as above

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours 7	None Estabilished	None Estabilished

Method and Procedure:

1. Yard preparation includes servicing truck and/or spraying equipment, filling sprayer or sprayers with herbicide mixture and the loading of additional materials as needed for the days operation.

2. Accessory equipment may include a tank or cans for the additional needed carrier and a 10” crescent and 12” pipe wrench. For manual operations an additional sprayer is also suggested.

3. Check spraying equipment for serviceability and calibrate as necessary.

4. ALL APPLICATIONS MUST BE MADE IN ACCORDANCE WITH LABEL DIRECTIONS.

5. Do not spray when stems and/or branches are wet.

6. The M-609 (Roadside Activity Report) must be completed for this activity. Documentation must include the work area(s), materials used, percent solution and application procedures, in addition to other standard information as required.

7. Personnel Safety – follow labeled instructions when mixing and applying herbicides. Wear required protective garments and do not breathe fumes or mist from the herbicide.

   Keep the eye wash syringe filled with clean water and readily available. When refilling spray equipment from a body of water, keep the discharge end of the hose or small spraying equipment out of the water to prevent siphoning or otherwise polluting the water source with the chemicals.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7716-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Revitalization Mechanized	143 Sq. Yds./Man Hr.

Assembly Description Summary
This assembly includes all actions related to the furnishing and placing of seed, soil supplements and mulch to roadside locations for the purpose of stabilizing roadway embankments and compliance with current erosion and sedimentation control mandates.

This work shall be programmed in accordance with the District Roadside Specialist who will determine the seed formula and material application rates for each project.

Unless otherwise directed all work shall be done in accordance with the current Department of Transportation specifications 408, Sections 804 & 805.

Mulching shall be done as a separate operation and shall not be applied with the seed and soil supplements other than special conditions, mulch materials shall be applied after the seeding operation.

Supervision and department inspection of all contract operations are cost credited to this program.

Exercise care to establish traffic control, wherever necessary in accordance with Publication #213, and observe safety precautions related to the work.

Reference current Department of Transportation Specifications 408, Sections 804 and 805.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1 1	Inspector Contract Crew (4 men)	1 1	Hydro Seeder Mulcher other equipment as required	As Required	Seed Fertilizer Lime approved mulch

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Square Yard Code A	560 S.Y./Hour	4200 S.Y./Day

Method and Procedure:
Varies according to job requirements.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7717-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Wildflowers	None Estabilished

Assembly Description Summary

This assembly includes all actions relating to the preparation of the soil for wildflower sites; the furnishing and placing of seeds of various plants which have growth and flowering characteristics desirable for highway roadsides; the maintenance of wild flower sites; and the propagation and enhancment of naturally occurring "wildflowers". This program will provide an acceptable roadside cover while maintaining a reduced mowing schedule; and will afford the necessary erosion and sediment control properties.

The program will be directed by the District Roadside Specialist in concert with the County Maintenance Manager. He will choose locations, types of seed and the planting procedures to be used.

Preferred locations include high visibility areas near the state border, gateways to cities and major points of interest. Median areas are top priority. Where possible, plots should be at least 500 ft. in length, and a mow area maintained between the plot and the edge of shoulder or roadway.

Seeding should be done between March 1 and May 15 depending on soil and climate conditions. Seeding may also be done in late fall, but not prior to a time when fall germination may occur.

All work should be done in accordance with the guidelines listed on reverse, and/or subsequent policy statement.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Contract or Method Applied				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Square Yard Code A	None Established	None Established

Method and Procedure:

SITE PREPARATION

Spraying - During the late summer or early fall spray all existing vegetation with Glyphosate (Roundup) at 4 qts./Acre with a non-ionic surfactant added at the rate of 0.25% v./v. Where broadleaf weeds and/or woody plants exist, add 1 qt. 2,4-D/acre plus 1 pt. Garion 3A/acres or 1 pt. Dicamba/acre to the Glyphosate. A follow-up spot treatment (as needed) should be applied in the spring 7 to 10 days prior to seeding. USE ONLY GLYPHOSATE at the above rate for the spot application.

Mowing - Sprayed areas with excessive plant residue shall be mowed to a height not exceeding 1/2 inch. Mowing shall be performed after herbicide control has been achieved (not less than 7 days after application), and just prior to seeding.

Slitting - Where seed will be broadcast or applied with a drop seeder the soil should be first be slit by the use of an agriculture disc with solid special blades set perpendicular so as not to till the soil; or any other equipment which will slice the soil to a depth not exceeding 3/8 inch. DO NOT TILL THE SOIL unless a fumigant is to be used.

SEEDING

Drill Seeders - There are several types of wildflower seed drills which slit the soil and place the seed in one operation. Any of the brand name units are recommended. When using agricultural drills however, care must be taken not to seed too deep. With any type of seed drill it is recommended that seeding be done at 1/2 rate for two passes in opposite directions, or by broadcasting the second half of the recommended rate.

Broadcasting - The recommended method is with a cyclone or drop seeder. Hand seeding can also be done but is difficult to get even distribution. With any of these methods the seed should be mixed with some type of soil or peat medium to avoid separation of the smaller seeds.

MAINTENANCE

Weed Control - Two methods of weed control are recommended: spot spraying and hoeing or hand pulling. When spraying, use Glyphosate at the same rate as for site preparation (spot treatment). Care must be exercised using either method so as not to affect or up-root flower plants.

Mowing - A fall mowing of the area is required during October or November after all flowering is completed. The height of this mowing will be 6 inches. Re-Seeding - If spot seeding is needed, carefully spot spray the area to remove unwanted plants and re-slit or lightly rake the areas to loosen the soil and re-seed.

Native Plants - Where natural stands of flowering plants (such as New England Aster, Queen Annes Lace, Birds foot trefoil Goldenrod, etc.) occur in the medians or interchanges special care should be exercised to preserve them where they do not create an unsafe condition. Grasses around these stands should be mowed in order to enhance their appearance.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7719-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Vegetation Management Scenic Feature Activities Other	None Estabilished

Assembly Description Summary
This assembly includes all actions related to vegetation management and scenic features assemblies which cannot be properly identified with one of the preceding vegetation management assemblies. However, this assembly does include revitalization of deteriorating slopes and roadside soil areas, minor planting, commemorative and cooperative planting, the maintenance of plantings, junkyard screenings (both vegetative and structural) and the planting, maintenance and management of scenic strips.

These assemblies are Performed at anytime of the year or during specific dates as outlined in Chapter 13 of the Maintenance Manual or in Section 800 of the Form 408 Construction Specifications.

Production units are measured in man hours.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements, however traffic and personnel protection as provided for in Publication 90 must be exercised.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7731-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Public Service Facilities Maintenance of Interstate Roadside Rest With All-Weather Buildings	None Estabilished

Assembly Description Summary
This assembly includes all actions related to the maintenance of roadside rests with all-weather buildings such as mowing, fertilizing, watering, raking, mulching, herbicide weed control on the grounds; repairing, replacing, repainting, cleaning, and periodic equipment servicing of building and equipment. The maintenance of signs, litter containers and snow and ice control are also included. Also includes picking up litter, litter disposal, and cleaning rest rooms. Service Purchase Contracts and Costs relative to electrical, plumbing, disposal and security service purchase contracts are activities covered under this operation.

This activity is performed on a 24 hour, 365 day per year basis.

Production units are measured in man hours.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
This is an off roadway activity the provisions of Publication 90 do not apply.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7732-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Public Service Facilities Maintenance of Interstate Roadside Rest and Roadside Table Sites and Overlooks	None Estabilished

Assembly Description Summary

This assembly includes all actions related to the maintenance of all other roadside rests, roadside table sites and overlooks not covered under activity #7731. Growing, fertilizing, watering, raking, mulching, herbicide weed control on the grounds, repairing, replacing and cleaning of the temporary facilities, placing and maintenance of roadside tables, signs, litter containers, and snow and ice control are included in this assembly. Also included is litter pickup and disposal and sanitary service purchase contracts.

Interstate and Non-Interstate rest areas without all-weather buildings are normally staffed through the tourist season (May-September) with temporary summer employees who have assigned work schedules. The responsible Highway Maintenance Foreman or Assistant Manager should verify summer employee work attendance, accomplishment and payroll preparation.

Production units are measured in man hours.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:

Varies according to job requirements, but Chapter 13 of the Maintenance Manual expands on this activity.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7735-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Public Service Facilities Roadside Litter Pick Up and Debris Removal	None Estabilished

Assembly Description Summary

This assembly includes all actions related to litter pickup and debris removal (within established highway right-of-way limits) as this litter and debris is generated by the motoring public and normal weather and wind conditions. Contract disposal costs are also included in this activity. Pickup of debris, etc., resulting from ice storms or high wind conditions should be charged to assembly 711-7351.

This assembly should be routinely performed along the highway system to maintain a safe, scenic and sanitary roadside condition. The annual "Great Pa Clean-up" campaign scheduled for the fourth Saturday of April is primarily an educational/public participation activity and is not intended to replace this routine, maintenance force litter pickup and debris removal activity. Charge GPC costs to assembly 612-9813-01.

For Department Forces a general cleanup of the right-of-way on expressways and major local service highways should be scheduled between early spring and fall of the year. On local service roads, one general cleanup a year may be sufficient. This preferably should take place prior to the mowing assembly. A routine trash cleanup should be scheduled for interchanges. The expressways, feeder system and more heavily traveled local roads should be scheduled at intervals designated by the Maintenance Manager. Traffic control and personnel safety are required as specified under Publication 213. This assembly should be considered a good candidate for a "rainy-day" activity or "down-time" fill in.

Every foreman should carry trash bags in his pick-up and utilize these at every opportunity. If he is working in a heavily littered area this area should be policed while the traffic control is set up.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe all safety precautions.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements, but Chapter 13 of the Maintenance Manual expands on this activity.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7735-02
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Public Service Facilities Roadside Tire Remnant Removal	None Estabilished

Assembly Description Summary
This assembly includes all actions related to tire remnant removal on interstate and interstate look-alike highways.

This assembly should be scheduled once a week on these type highways.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements, but Chapter 13 of the Maintenance Manual expands on this activity.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 714-7739-01
		EFFECTIVE DATE July 1, 2014

ASSEMBLY	PERFORMANCE STANDARD
Public Service Facilities Other	None Estabilished

Assembly Description Summary
This assembly includes all actions related to miscellaneous public service facility assemblies which cannot be properly charged to one of the previous codes in the 7730 series.

Production units are measured in man hours.

Exercise care to establish traffic control, wherever necessary, in accordance with Publication #213 and observe safety precautions related to the work.

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
	Varies According to Job Requirements				

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hours Code 7	None Established	None Established

Method and Procedure:
Varies according to job requirements.

CHAPTER 6 – COST FUNCTION DEFINITIONS

ASSEMBLY DEFINITIONS

ALLOTMENTS 719 AND 822

719 MAINTENANCE ADMINISTRATION

This program provides for administrative costs which are related to highway maintenance assemblies but not identifiable with a specific highway maintenance or service function program.

ASSEMBLY	METHOD	
9812	01	IN-SERVICE TRAINING - Include under this assembly is all costs relative to specialized training courses undertaken by the Department for those employees in the Maintenance Districts, who for payroll purposes are regularly assigned to Program 719, MAINTENANCE ADMINISTRATION. Specialized training courses may include, but not be limited to, defensive driver training, training employees to operate Department equipment, Management seminars, etc. The production unit is measured in MAN HOURS.

ASSEMBLY	METHOD	
9816	01	MATERIAL TESTING AND FIELD TESTING - Various - Includes all actions related to the field testing and of all materials by field personnel. Personnel as-signed to job sites for the purpose of receiving materials should charge their time to the Assembly/Method on which the material is to be used. If the Assembly/Method is not identifiable then this cost function method (719-9816-01) should be used. The production unit is measured in MAN HOURS.

ASSEMBLY	METHOD	
9829	01	OTHER MAINTENANCE ADMINISTRATION ASSEMBLY - Include the salaries, wages, leave, time and other expenses of those employees in the Central Office and Maintenance Districts whose primary duties are related to maintenance assembly, and who for payroll purposes are regularly assigned to Program 719 through the medium of the employee's Form P-319, (REQUESTS FOR PAYROLL CHANGE). Does not include any costs for permit work. Permit work shall be charged to 719-9141, 9142, 9143, or 9149, whichever is applicable. The production unit is measured in MAN HOURS.

ASSEMBLY	METHOD	
9851	01	HAZARDOUS WASTE INVENTORY REMOVAL - Includes all actions related to the removal of hazardous waste material generated by all assemblies EXCEPT 813 assemblies. The production unit is measured in MAN HOURS.

ASSEMBLY	METHOD	
9812	01	IN-SERVICE TRAINING - Include under this assembly all costs relative to specialized training courses undertaken by the Department for those employees in the Maintenance Districts, who for payroll purposes, are regularly assigned to Program 813, MAINTENANCE AND OPERATION OF EQUIPMENT & MACHINERY. Other specialized training courses such as defensive driver training, management seminars, training employees to operate Department equipment, etc. shall be charged to Work Program 719-9812-01, IN-SERVICE TRAINING. The production unit is reported in MAN HOUR.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 813-8113-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Fuel Truck Operator Labor For The Dispensing Of Fuel	None Applicable

Assembly Description Summary

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Equipment Operator	1	Fuel Truck	N/A	N/A

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Zero (0)	None Established	None Established

Method and Procedure:
The fuel truck operator dispenses fuels, lubricants, motor oil, anti-freeze, DPF fluid, etc., using county Standing Work Order (SWO) and ORG-9999. The production is measured in MAN HOUR.

Note* All required repairs to the fuel truck itself will be charged directly to the fuel truck equipment number.

M-200L ( ) pennsylvania DEPARTMENT OF TRANSPORTATION	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 813-8372-01
		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Cleaning equipment prior to PM's only	None Applicable

Assembly Description Summary

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Any employee	1	Any type	N/A	N/A

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Man Hour	None Established	None Established

Method and Procedure:
This assembly will only be used to clean equipment prior to a PM. All other equipment cleaning will be charged to the activity/assembly of the day.

M-200L ( )	BUREAU OF MAINTENANCE AND OPERATIONS PERFORMANCE STANDARD	ASSEMBLY NUMBER 813-8375-01
pennsylvania DEPARTMENT OF TRANSPORTATION		EFFECTIVE DATE July 3, 2017

ASSEMBLY	PERFORMANCE STANDARD
Transportation/Hauling of Equipment	None Applicable

Assembly Description Summary

ASSEMBLY REQUIREMENTS

PERSONNEL		EQUIPMENT		MATERIAL	
Number	Classification	Number	Type	Amount	Description
1	Equipment Operator	1 1 Or 1 1	Lowboy Tractor Lowboy Trailer Truck Trailer	N/A	N/A

PRODUCTION UNIT	PROD.UNIT/HOURS	PLANNING UNITS
Each * (Note below)	None Established	None Established

Method and Procedure:

This assembly is for the transportation of equipment for Department/vendor repair, warranty repair, picking up of new equipment (located at Fleet Management Division) or for equipment to be sold at auction. Assembly 711-7491-01 will be used for all actions related to the hauling of non-disabled equipment using a lowboy.

* Note: SAP unit of measure is each and cannot be changed. Foreman must charge personnel hours for production hours and production units.

SPECIAL PAYMENTS

822 MAINTENANCE AND OPERATION OF BUILDINGS AND GROUNDS

ASSEMBLY	METHOD	
1201	01	MAINTENANCE OF BUILDINGS - Includes all actions related to the maintenance of Department owned or leased buildings such as janitorial work (sweeping and washing floors, washing windows, disposing of trash, cleaning buildings). Also includes the payments for electrical expenses for the buildings, heating and other fuel costs associated with maintenance and operation of the buildings, water and sewage expenses and payments for building rental for storage of equipment, excluding automobiles. DO NOT include cleaning of equipment. The production unit is measured in MAN HOURS.

ASSEMBLY	METHOD	
1202	01	MAINTENANCE OF GROUNDS - Includes all actions related to the maintenance of Department owned or leased grounds such as removal of snow from walks, disposing of litter, mowing, fertilizing, watering of the grounds, etc. DO NOT include roadside rests. They will be charged under Allotment 714. The production unit is measured in MAN HOURS.

ASSEMBLY	METHOD	
9812	01	IN-SERVICE TRAINING - Include under this assembly all costs relative to specialized training courses undertaken by the Department for those employees in the Maintenance Districts, who for payroll purposes are regularly assigned to Program 822, MAINTENANCE AND OPERATIONS OF BUILDING AND GROUNDS. Specialized training courses under this assembly shall include all courses directly related to the MAINTENANCE AND OPERATION OF BUILDING & GROUNDS. Other specialized training courses such as defensive driving management seminars, training employees to operate Department equipment, etc., shall be charged to Work Program 719-9812-01, IN SERVICE TRAINING. The production unit is reported in MAN HOURS.

CHAPTER 8 - MISCELLANEOUS DEFINITIONS

MISCELLANEOUS DEFINITIONS

ACTIVITY HOURS	The total man hours expended in performing an activity (711-7212-01 Unpaved Shoulder Grading). ACTIVITY HOURS equals PRODUCTION HOURS.
AGREEMENT NUMBER	The ten digit Purchase Order Number given to the rental agreement for a piece of outside rented equipment.
CHARGED WORK CENTER	The immediate supervisor of the employee or the foreman immediately responsible for the work being performed.
ASSEMBLY	The code which describes the nature of work performed under a given program. It is the set of four digits in the Work Program Number.
CREW	Crew is the man-power used to perform an activity. It usually consists of a foreman, equipment operators, and non-equipment operators. The performance standard specifies the crew required to achieve standard performance.
DIAMETER BREAST HEIGHT	Diameter of the tree, four (4) feet above ground. (D. B. H.)
DELAY	A delay is an occurrence or set of conditions which slow down or stop progress on the work to be performed. A delay of less than one-half hour elapsed time will be reported against the scheduled activity; if over one-half hour the crew shall be assigned an alternate activity and their time reported is the alternate activity.
EMPLOYE BENEFITS IN-SERVICE TRAINING	To qualify as In-Service training the session should meet the following criteria: 1. It should be pre-planned and scheduled. 2. It should have a predetermined, measurable instructional objective. 3. It should have as a base, Department approved training materials. 4. It should include instructor preparation. 5. It should utilize the principle of learning. 6. It should be recorded on an individual record card of training when completed.
EQUIPMENT DELAY	Delay of productive work accomplishment because of the absence, breakdown, or improper functioning of a piece of equipment required by the activity.
EQUIPMENT NUMBER	The official number given a piece of Department owned equipment. It consists of a “P” followed by 2 sets of numbers. The first set has 3 digits and the second as 4 digits, i.e., Pxxx-xxxx.
EQUIPMENT TRANSFER	The movement of equipment on flat bed trailers, self-propulsion, or by other means to or from a work site or inter county or inter district. Transfer time is reported in man hours. Transfer of New Equipment or transfer of equipment for sale shall be charged to Program 813, Cost Function 8375.

WORK CENTER NUMBER The two digit number given to each foreman to identify him on reports.

MAN HOURS — The elapsed time in hours multiplied by the number of employees used to perform the related action.

MATERIAL DELAY — A material delay is a delay caused by the absence of material or the necessity to modify incorrect material.

METHOD — A method states how an assembly is to be performed. The basic methods are manual or mechanized with possible further divisions according to type of equipment used.

MFC — MAINTENANCE FUNCTIONAL CODE - The highway functional classification system. This code is used to gather maintenance cost information by functional class of highway.

A = INTERSTATE
B = OTHER FREEWAY, EXPRESSWAY or PRINCIPAL ARTERIAL
C = MINOR ARTERIAL
D = COLLECTOR
E = LOCAL LAND ACCESS

NON-OPERATOR — Equipment which does not normally require a classified equipment operator to operate. This type of equipment includes:

CREW CAB	AIR COMPRESSOR
HEATING KETTLE	COMPACTOR
TOW PAVER	POWER BRUSH
CHAIN SAW	POWER ROUTER
TOWED BROOM	ETC

OFFSET — The centerline distance measured in feet from the beginning of a segment. This figure is used to identify the location of an item with in a segment, such as a pipe, a string of guide rail, etc.

PLANT — The 4 digit District/County code.

PAY CODE — A 2 digit code used to record time worked other than normal time, such as holidays, seventh day, etc. See Chapter - 03 for a list of pay codes and their usage.

PERFORMANCE STANDARD — A performance standard is like an average, not always exact but a good working figure which is reasonable, fair, and can serve as a readily available benchmark for the activity and method to which it applies. It represents a reasonable expectancy of productive output by a crew of specified men and equipment. The performance standard is in terms of man hours per production unit.

PERFORMANCE HOURS — The number of man hours expended on an activity where a PERFORMANCE STANDARD has been established and is in effect. This term will normally only appear on the MORIS performance reports.

PHASE — The code that identifies a project as type of work being done whether P.O.C., D.F., Design, Right-of-Way, Maintenance, etc. The phase shall be coded as follows:

IDENTIFIES	CODE
DESIGN 21's	4
UTILITIES	5
RIGHT OF WAY	6
HIGHWAY CONSTRUCTION	7
MAINTENANCE CONTRACTS OR P.O.C.	8
MAINTENANCE ALLOTMENTS	9
711, 712, 713, or 714 & OTHER DEPT. FORCE	

PRODUCTION — Completion of required maintenance work in accordance with performance standards. Production is based on an out-come which can be reasonably measured. (Tons, Gallons, Etc.)

PRODUCTION HOURS — The man hours expended in performing productive work as defined in the performance standards. PRODUCTION HOURS are equal to PROJECT HOURS WORKED.

PRODUCTION CODE — A single character alpha or numeric code used to represent the Production Description used for the work activity involved.

PRODUCTION DESCRIPTION — A measurable expression of work performed.

PRODUCTION UNITS — The completed quantity of the described production.

PROGRAM — A coding in the Accounting System for the allocation of funds for Department programs. It is the set of three digits appearing first in the Work Program Number. (711 – General Maintenance, 712 – Winter, 713 – Traffic, 714 – Roadside, etc.)

NOTIFICATION — A maintenance work activity as described in the Assembly.

SR — The 4 digit State Route number assigned to designate a highway. The values are numeric.

SAFETY — Safety is usually related to traffic control and warning devices associated with work site or area protection. The Publication "Work Area Traffic Control" determines the type of protection required for each highway type.

SECTION — The Section Number consists of either three digits or two digits followed by an "M" or three zeros. It is part of the State Project Number. The composition of the number is as follows:

ALLOTMENT — STATE PROJECT NUMBER

381	xxx
383	xxm
71X	000

SEGMENT — Designated sections of a State Route. The assigned values are numeric beginning with 010 and increasing incrementally by 10 (020, 030, etc.). A segment can vary between 1300 and 3800 feet and usually begins and ends at easily identifiable features such as intersecting roads, bridges, culverts, etc.

STANDARD HOURS — The number of productive man hours specified by the performance standard multiplied by the number of units of work accomplished. The performance standard is in terms of production units per man hour.

STANDBY DELAY — Delay of productive work accomplishment until men and equipment have reported to designated locations.

STATE PROJECT NUMBER — The State Project Number is a 15 digit alpha numeric code used by Design, Right-of-Way and Construction. It identifies a highway through its various phases. The order of the 15 digits is outlined in Master Policy Statement 20601.002. The State Project Number Block on the Crew Daily Project Time Record and Diary also requires a 15 digit alpha numeric code which differs somewhat from the one used by Design, etc. The 15 digits of the "Maintenance" State Project Number are in the following order:

DIGI SIGNIFIES PLACEMENT

1	Road System
2-6	State Route Number or Work Order
7	Parallel Extension or Ramp
8	Phase of Work
9-11	Section Number
12-15	Organization/County

Note: The definitions of the various components discussed elsewhere in this section apply only to the "Maintenance" State Project Number.

SYSTEM — A one (1) digit alpha code which identifies the functional classification of a given road segment. It is also known as the Maintenance Functional Code.

TRAFFIC CONTROL — Work site protection to warn traffic that a temporary reduced speed or stop condition exists. Warning devices such as flagmen, traffic cones, signs, crash trucks, etc. are used.

TRAINING IN-SERVICE — See EMPLOYEE BENEFITS IN-SERVICE TRAINGING

WORK ORDER — Prioritized list of Notifications.

CHAPTER 9 MAINTENANCE REFERENCE TABLES

INSTRUCTIONS

THE FOLLOWING FACTS SHOULD BE NOTED AND CONSIDERED WHEN USING THESE MAINTENANCE REFERENCE TABLES

1. Most of the tables are rounded off and; therefore, give only approximate values.

2. Since the values shown in the tables are rounded off, do not carry out multiplying or dividing results to several decimal places. In fact, the DAILY PROJECT TIME RECORD - ID-65 is designed to accept only one decimal place. Therefore, no calculation should be carried beyond one decimal place.

3. When using the tables to calculate material required for a project, increase the required amount by ten (10) percent. Not having enough to finish the job can lead to loss of time and productivity. It is always better to return some material to the yard than to not have enough to finish the job.

SECTION ONE: AREAS AND RATES OF APPLICATION

1.1 Acreage - Right-of-Way

1.2 Acreage - Interchange

1.3 Sq Yds of Road Surface of Various Road Width

1.4 Circles - Lineal and Area Measurements

1.5 Lineal Ft Covered by 1000-Gal of Materials

1.6 Gallons of Asphalt Required per Mile for Various Rates of Application

1.7 Tons of Aggregate Required per Mile for Various Rates of Application

SECTION TWO: VOLUMES AND WEIGHTS

2.1 Number of Gallons in Tanks of Various Sizes (Based on percent of capacity)

2.2 Storage Capacity (In Tons) of Cone or Tent Shaped Stockpiles of Sand or Gravel

2.3 Storage Capacity (In Tons) of Cone or Tent Shaped Stockpiles of Crush Stone

2.4 Loose and Compacted Weights of Various Material

2.5 Pounds of Compacted Aggregate Required per Square Yard for Various Cubic Yards Weights.

2.6 Cubic Yards of Material Required per 100 Lineal Feet for Various Loose Depths

2.7 Cubic Yards of Material Required per Foot for a Typical Installation

2.8 Number of Board Feet per Lineal Feet for Various Sizes of Lumber

SECTION THREE: CONVERSION FACTORS

3.1 Conversion Factors - Length Measurements

3.2 Conversion Factors - Area Measurements

3.3 Conversion Factors - Volume Measurements

3.4 Conversion Factors - Weights and Other Measurements

3.5 Conversion Factors - Common Fractions to Decimal Numbers

3.6 Conversion Factors - Cubic Yards to Tons

3.7 Conversion Factors - Minutes to Tenths of an Hour

3.8 Conversion Factors - 50 Pound Cans of Para Plastic Joint sealing Compound to Gallons

SECTION FOUR: MISCELLANEOUS FACTORS

4.1 Approximate Angle of Repost for Sloping of Sides of Excavations

4.2 Trench Shoring - Minimum Requirements.

Table 1.1 ACREAGE- RIGHT-OF-WAY

Width	Length in miles																		
in feet	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	2	3	4	5	6	7	8	9	10
1	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1	1.1	1.2
2	0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.5	0.7	1	1.2	1.5	1.7	1.9	2.2	2.4
3	0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.6
4	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	1	1.5	1.9	2.4	2.9	3.4	3.9	4.4	4.9
5	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.6	1.2	1.8	2.4	3	3.6	4.2	4.9	5.5	6.1
6	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	1.5	2.2	2.9	3.6	4.4	5.1	5.8	6.5	7.3
7	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.7	2.6	3.4	4.2	5.1	5.9	6.8	7.6	8.5
8	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7
9	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1	1.1	2.2	3.3	4.4	5.5	6.5	7.6	8.7	9.8	10.9
10	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1	1.1	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.1
20	0.2	0.5	0.7	1	1.2	1.5	1.7	1.9	2.2	2.4	4.9	7.3	9.7	12.1	14.6	17	19.4	21.8	24.2
30	0.4	0.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.6	7.3	10.9	14.6	18.2	21.8	25.5	29.1	32.7	36.4
40	0.5	1	1.5	1.9	2.4	2.9	3.4	3.9	4.4	4.9	9.7	14.6	19.4	24.2	29.1	33.9	38.8	43.6	48.5
50	0.6	1.2	1.8	2.4	3	3.6	4.2	4.9	5.5	6.1	12.1	18.2	24.2	30.3	36.4	42.4	48.5	54.6	60.6
60	0.7	1.5	2.2	2.9	3.6	4.4	5.1	5.8	6.6	7.3	14.6	21.8	29.1	36.4	43.6	50.9	58.2	65.5	72.7
70	0.9	1.7	2.6	3.4	4.2	5.1	5.9	6.8	7.6	8.5	17	25.5	33.9	42.4	50.9	59.4	67.9	76.4	84.9
80	1	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7	19.4	29.1	38.8	48.5	58.2	67.9	77.6	87.3	97
90	1.1	2.2	3.3	4.4	5.5	6.6	7.6	8.7	9.8	10.9	21.8	32.7	43.6	54.6	65.5	76.4	87.3	98.2	109.1
100	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.1	24.2	36.4	48.5	60.6	72.7	84.9	97	109.1	121.2

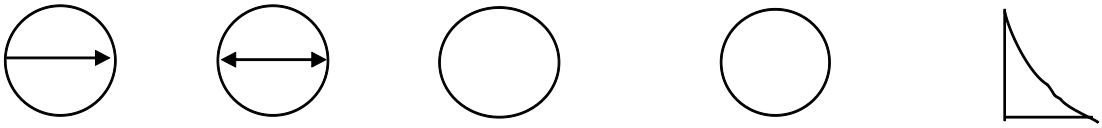
Table 1.2 - ACREAGE- INTERCHANGE

	Length in feet																		
in feet	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**	**200**	**300**	**400**	**500**	**600**	**700**	**800**	**900**	**1000**
10	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2
20	0	0	0	0	0	0	0	0	0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
30	0	0	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.7
40	0	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.9
50	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1	1.2
60	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.4	0.6	0.7	0.8	1	1.1	1.2	1.4
70	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.6	0.8	1	1.1	1.3	1.5	1.6
80	0	0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.8
90	0	0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.4	0.6	0.8	1	1.2	1.5	1.7	1.9	2.1
100	0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.5	0.7	0.9	1.2	1.4	1.6	1.8	2.1	2.3
200	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.9	1.4	1.8	2.3	2.8	3.2	3.7	4.1	4.6
300	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6	0.7	1.4	2.1	2.8	3.4	4.1	4.8	5.5	6.2	6.9
400	0.1	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.8	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.3
500	0.1	0.2	0.3	0.5	0.6	0.7	0.8	0.9	1	1.2	2.3	3.4	4.6	5.7	6.9	8	9.2	10	11.5
600	0.1	0.3	0.4	0.6	0.7	0.8	1	1.1	1.2	1.4	2.8	4.1	5.5	6.9	8.3	9.6	11	12	13.8
700	0.2	0.3	0.5	0.6	0.8	1	1.1	1.3	1.5	1.6	3.2	4.8	6.4	8	9.6	11	13	15	16.1
800	0.2	0.4	0.6	0.7	0.9	1.1	1.3	1.5	1.7	1.8	3.7	5.5	7.4	9.2	11	13	15	17	18.4
900	0.2	0.4	0.6	0.8	1	1.2	1.5	1.7	1.9	2.1	4.1	6.2	8.3	10	12	15	17	19	20.7
1000	0.2	0.5	0.7	0.9	1.2	1.4	1.6	1.8	2.1	2.3	4.6	6.9	9.2	12	14	16	18	21	23

Table 1.3 Square Yards of Road Surface for Various Road Widths

	Square Yards of Road Surface				Square Yards of Road Surface		
Road Width	Per Lineal Foot	Per 100 Feet	Per Mile	Road Width	Per Lineal Foot	Per 100 Feet	Per Mile
6'	0.67	66.67	3,520	24'	2.67	266.67	14,080
7'	0.78	77.78	4,107	25'	2.78	277.78	14,667
8'	0.89	88.89	4,693	26'	2.89	288.89	15,253
9'	1.00	100.00	5,280	28'	3.11	311.11	16,427
10'	1.11	111.11	5,867	30'	3.33	333.33	17,600
11'	1.22	122.22	6,453	32'	3.56	355.56	18,773
12'	1.33	133.33	7,040	34'	3.78	377.78	19,947
13'	1.44	144.44	7,627	36'	4.00	400.00	21,120
14'	1.56	155.56	8,213	38'	4.22	422.22	22,293
15'	1.67	166.67	8,800	40'	4.44	444.44	23,467
16'	1.78	177.78	9,387	50'	5.56	555.56	29,333
17'	1.89	188.89	9,973	60'	6.67	666.67	35,200
18'	2.00	200.00	10,560	70'	7.78	777.78	41,067
20'	2.22	222.22	11,733	75'	8.33	833.33	44,000

TABLE 1.4 CIRCLES- LINEAL AND AREA MEASUREMENTS



RADIUS	DIAMETER	CIRCLE AREA	CIRCUMFERENCE	FILLET AREA
1.00	2.00	3.14	6.28	0.21
1.25	2.50	4.91	7.85	0.34
1.50	3.00	7.07	9.42	0.48
1.75	3.50	9.62	11.00	0.66
2.00	4.00	12.57	12.57	0.86
2.25	4.50	15.91	14.14	1.09
2.50	5.00	19.63	15.91	1.34
2.75	5.50	23.76	17.28	1.62
3.00	6.00	28.27	18.85	1.93
3.25	6.50	33.18	20.42	2.27
3.50	7.00	38.48	21.99	2.63
3.75	7.50	44.18	23.56	3.02
4.00	8.00	50.27	25.13	3.43
4.25	8.50	56.75	26.70	3.88
4.50	9.00	63.62	28.27	4.35
4.75	9.50	70.88	29.85	4.84
5.00	10.00	78.54	31.42	5.37
5.25	10.50	86.59	32.99	5.91
5.50	11.00	95.03	34.56	6.49
5.75	11.50	103.87	26.13	7.09
6.00	12.00	113.10	37.70	7.73
6.25	12.50	122.72	39.27	8.38
6.50	13.00	132.73	40.84	9.07
6.75	13.50	143.14	42.41	9.78
7.00	14.00	153.94	43.98	10.52
7.25	14.50	165.13	45.55	11.28
7.50	15.00	176.72	47.12	12.07
7.75	15.50	188.69	48.69	12.89
8.00	16.00	201.06	50.27	13.73
8.25	16.50	213.83	51.84	14.61
8.50	17.00	226.98	53.41	15.50
8.75	17.50	240.53	54.98	16.43
9.00	18.00	254.47	56.55	17.38
9.25	18.50	268.80	58.12	18.36
9.50	19.00	283.53	59.69	19.37
9.75	19.50	298.65	61.26	20.40
10.00	20.00	314.16	62.83	21.46

TABLE 1.5 Lineal Feet Covered by 1000- Gallons of Material

Road Width	Gallons Per Square Yard																
in Feet	0.1	0.15	0.2	0.25	0.3	0.33	0.35	0.4	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	2
8'	11,250	7,500	5,625	4,500	3,750	3,375	3,214	2,813	2,250	1,875	1,607	1,406	1,250	1,125	900	750	563
9'	10,000	6,667	5,000	4,000	3,333	3,000	2,857	2,500	2,000	1,667	1,429	1,250	1,111	1,000	800	667	500
10'	9,000	6,000	4,500	3,600	3,000	2,700	2,571	2,250	1,800	1,500	1,286	1,125	1,000	900	720	600	450
11'	8,182	5,455	4,091	3,273	2,727	2,455	2,338	2,045	1,636	1,364	1,169	1,023	909	818	655	545	409
12'	7,500	5,000	3,750	3,000	2,500	2,250	2,143	1,875	1,500	1,250	1,071	938	833	750	600	500	375
14'	6,429	4,286	3,214	2,571	2,143	1,929	1,837	1,607	1,286	1,071	918	804	714	643	429	429	321
15'	6,000	4,000	3,000	2,400	2,000	1,800	1,714	1,500	1,200	1,000	857	750	667	600	400	400	300
16'	5,625	3,750	2,813	2,250	1,875	1,688	1,607	1,406	1,125	938	804	703	625	563	375	375	281
18'	5,000	3,333	2,500	2,000	1,667	1,500	1,429	1,250	1,000	833	714	625	556	500	333	333	250
20'	4,500	3,000	2,250	1,800	1,500	1,350	1,286	1,125	900	750	643	563	500	450	300	300	225
21'	4,091	2,727	2,045	1,636	1,364	1,227	1,169	1,023	818	682	584	511	455	409	273	273	205
24'	3,750	2,500	1,875	1,500	1,250	1,125	1,071	938	750	625	536	469	417	375	250	250	188
25'	3,600	2,400	1,800	1,440	1,200	1,080	1,029	900	720	600	514	450	400	360	288	240	180
26'	3,462	2,308	1,731	1,385	1,154	1,038	989	865	692	577	495	433	385	346	277	231	173
28'	3,214	2,143	1,607	1,286	1,071	964	918	804	643	536	459	402	357	321	257	214	161
30'	3,000	2,000	1,500	1,200	1,000	900	857	750	600	500	429	375	333	300	240	200	150

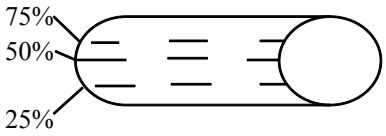
TABLE 1.6 - Gallons of Asphalt Required per mile for Various Rates of Application

Road Width	Gallons per Square Yard																
in Feet	0.1	0.15	0.2	0.25	0.3	0.33	0.35	0.4	0.5	0.6	0.7	0.8	0.9	1	1.25	1.5	2
8'	469	704	939	1173	1408	1564	1643	1877	2347	2816	3285	3755	4224	4693	5867	7040	9387
9'	528	792	1056	1320	1584	1760	1848	2112	2640	3168	3696	4224	4752	5280	6600	7920	10560
10'	587	880	1173	1467	1760	1956	2053	2347	2933	3520	4107	4693	5280	5867	7333	8880	11733
11'	645	968	1291	1613	1936	2151	2259	2581	3227	3872	4517	5163	5808	6453	8067	9680	12907
12'	704	1056	1408	1760	2112	2347	2464	2816	3520	4224	4928	5632	6336	7040	8800	10560	14080
14'	821	1232	1643	2053	2464	2738	2857	3285	4107	4928	5749	6571	7392	8213	10267	12320	16427
15'	880	1320	1760	2200	2640	2933	3080	3520	4400	5280	6160	7040	7920	8800	11000	13200	17600
16'	939	1408	1877	2347	2816	3129	3258	3755	4693	5632	6571	7509	8448	9387	11733	14080	18773
18'	1056	1584	2112	2640	3168	3520	3696	4224	5280	6336	7392	8448	9504	10560	13200	15840	21120
20'	1173	1760	2347	2933	3520	3911	4107	4693	5867	7040	8213	9387	10560	11733	14667	17600	23467
22'	1291	1936	2581	3227	3872	4302	4517	5163	6453	7744	9039	10325	11616	12907	16133	19360	25813
24'	1408	2112	2816	3520	4224	4693	4928	5632	7040	8448	9856	11264	12672	14080	17600	21120	28160
25'	1467	2200	2933	3667	4400	4889	5133	5867	7333	8800	10267	11733	13200	14667	18333	22000	29333
26'	1525	2288	3051	3813	4576	5084	5339	6101	7627	9152	10677	12203	13728	15253	19067	22880	30507
28'	1643	2464	3285	4107	4928	5476	5749	6571	8213	9856	11499	13141	14784	16427	20533	24640	32853
30'	1760	2640	3520	4400	5280	5867	6160	7040	8800	10560	12320	14080	15840	17600	22000	26400	35200

TABLE 1.7 Tons of Aggregate Required Per Mile for Various Rates of Application

Width of Area in	Pounds Per Square Yard														
Feet	3#	5#	7#	8#	10#	12#	15#	20#	25#	30#	35#	40#	45#	50#	100#
8'	7.0	12	16	19	23	28	35	47	59	70	82	94	106	117	235
9'	7.9	13	18	21	26	32	40	53	66	79	92	106	119	132	264
10'	8.8	15	20	23	29	35	44	59	73	88	103	116	132	147	293
11'	9.7	16	23	26	32	39	48	65	81	97	113	129	145	161	323
12'	11	18	25	28	5	42	53	70	88	106	123	141	158	176	352
14'	12	20	29	33	41	49	62	82	103	123	144	164	185	205	410
15'	13	22	31	35	44	42	66	88	110	132	154	176	198	220	440
16'	14	23	33	38	47	56	70	94	117	140	164	188	211	235	469
18'	16	26	37	42	53	63	80	106	132	158	185	212	238	264	529
20'	18	29	41	47	59	70	88	118	147	176	205	235	264	293	587
22'	19	32	45	52	65	77	97	129	161	194	226	258	290	323	645
24'	21	35	49	56	70	84	105	141	176	212	246	282	317	352	704
25'	22	37	51	59	73	88	110	147	183	220	257	294	330	366	733
26'	23	38	53	61	76	92	114	152	191	228	267	305	343	381	762
28'	25	41	57	66	82	99	123	164	205	246	287	328	370	410	820
30'	26	44	62	70	88	106	132	176	220	264	308	352	396	440	

Table 2.1 - Number of Gallons in Tanks of Various Sizes (Based on Percent of Capacity)



Percent of Depth	Percent of Capacity	Number of Gallons in Tank						
		600 Gallon Tank	800 Gallon Tank	1000 Gallon Tank	1200 Gallon Tank	1500 Gallon Tank	2000 Gallon Tank	2500 Gallon Tank
1	0.2	1	2	2	2	3	4	5
2	0.5	3	4	5	6	8	10	13
3	0.9	5	7	9	11	14	18	23
4	1.3	8	11	13	16	0.2	27	34
5	1.9	11	15	19	22	28	37	47
6	2.5	15	20	25	29	37	49	61
7	3.1	18	25	31	37	46	61	77
8	3.7	22	30	37	45	56	75	94
9	4.5	27	36	45	53	67	89	111
10	5.2	31	42	52	62	78	104	130
11	6	36	48	60	72	90	120	150
12	6.8	41	54	68	82	102	136	170
13	7.6	46	61	76	92	115	153	191
14	8.5	51	68	85	102	128	175	213
15	9.4	56	75	94	113	141	188	235
16	10.3	62	83	103	124	155	206	258
17	11.3	68	90	113	135	169	225	282
18	12.2	73	98	122	147	184	245	306
19	13.2	79	106	132	159	199	265	331
20	14.2	85	114	142	171	214	285	356

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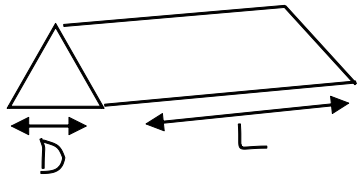
Percent of Depth	Percent of Capacity	Number of Gallons in Tank						
		600 Gallon Tank	800 Gallon Tank	1000 Gallon Tank	1200 Gallon Tank	1500 Gallon Tank	2000 Gallon Tank	2500 Gallon Tank
21	15.3	92	122	153	186	229	305	382
22	16.3	98	131	163	196	245	326	408
23	17.4	104	139	174	209	261	348	435
24	18.5	111	148	185	222	278	370	463
25	19.6	118	157	196	235	294	392	490
26	20.7	124	166	207	249	311	415	518
27	21.9	131	175	219	262	328	437	547
28	23	138	184	230	276	345	460	575
29	24.1	144	193	241	289	361	481	602
30	25.3	152	203	253	304	380	506	633
31	26.5	159	212	265	318	397	530	662
32	27.7	166	221	277	332	415	553	692
33	28.8	173	231	288	346	433	577	721
34	30	180	240	300	360	451	601	751
35	31.2	187	250	312	374	468	624	780
36	32.4	195	260	324	389	487	649	811
37	33.7	202	269	337	404	505	673	842
38	34.9	209	279	349	419	524	698	873
39	36.1	217	289	361	434	542	723	904
40	37.4	224	299	374	449	561	748	935
41	38.6	232	309	386	464	580	793	966
42	39.9	239	319	399	479	598	798	997
43	41.1	247	329	411	494	617	823	1029
44	42.4	254	339	424	509	636	848	1060
45	43.7	262	349	437	524	655	873	1092
46	44.9	270	359	449	539	674	898	1123
47	46.2	277	370	462	554	693	924	1155
48	47.5	285	380	475	5699	712	949	1186
49	48.7	292	390	487	585	731	975	1218
50	50	300	400	500	600	750	1000	1250

Table 2.2 Storage Capacity (in tons) of Cone or Tent Shaped Stockpiles of Sand or Gravel

Stockpile Length in Feet	Base Width (Diameter) of Stockpile in Feet													
	10	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**
10	5													
12	7													
15	10	17												
17.5	12	22												
20	14	27	39											
22.5	17	33	49											
25	19	38	58	77										
27.5	21	43	68	92										
30	24	48	77	110	130									
32.5	26	54	87	120	150									
35	28	59	96	140	180	210								
37.5	31	64	110	150	200	240								
40	33	70	120	170	220	270	320							
42.5	36	75	120	180	240	300	350							
45	38	80	130	200	260	330	390	450						
47.5	40	86	140	210	280	360	430	500						
50	43	91	150	220	300	380	470	540	620					
52.5	45	96	160	240	320	410	500	590	670					
55	47	100	170	250	340	440	540	640	730	820				
57.5	50	110	180	270	370	470	580	690	790	890				
60	52	110	190	280	390	500	620	740	850	860	1100			
62.5	54	120	200	300	410	530	650	780	910	1000	1100			
65	57	120	210	310	430	560	690	830	970	1100	1200	1400		
67.5	59	130	220	330	450	590	730	880	1000	1200	1300	1500		
70	61	130	230	340	470	610	770	930	1100	1200	1400	1600	1700	
72.5	64	140	240	360	490	640	800	970	1100	1300	1500	1700	1800	
75	66	140	250	370	510	670	840	1000	1200	1400	1600	1800	1900	2100
For each additional 10 feet beyond the 75-foot length in this table, add the following values														
	9	21	38	59	85	115	150	190	235	285	340	400	460	530



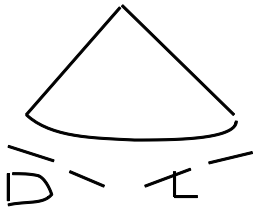


Table 2.3 Storage Capacity (in tons) of Cone or Tent Shaped Stockpiles of Crushed Stone

Stockpile Length in Feet	Base Width (Diameter) of Stockpile in Feet													
	10	15	20	25	30	35	40	45	50	55	60	65	70	75
10	5													
12.5	8													
15	11	19												
17.5	13	24												
20	16	30	44											
22.5	19	36	54											
25	21	42	65	86										
27.5	24	48	75	100										
30	26	54	86	120	150									
32.5	29	60	96	130	170									
35	32	66	110	150	200	240								
37.5	34	72	120	170	220	270								
40	37	78	130	180	240	300	350							
42.5	40	83	140	200	270	330	390							
45	42	89	150	220	290	360	440	500						
47.5	45	95	160	230	210	400	480	550						
50	47	100	170	250	340	430	520	610	690					
52.5	50	110	180	270	360	460	560	660	750					
55	53	110	190	280	380	490	600	710	820	910				
57.5	55	120	200	300	400	520	640	770	880	990				
60	58	120	210	320	430	560	690	820	950	1100	1200			
62.5	61	130	220	330	450	590	730	870	1000	1200	1300			
65	63	140	230	350	480	620	770	920	1100	1200	1400	1500		
67.5	66	140	240	360	500	650	800	980	1100	1300	1500	1600		
70	68	150	250	380	530	680	850	1000	1200	1400	1600	1700	1900	
72.5	71	150	260	400	550	720	900	1100	1300	1500	1700	1800	2000	
75	74	160	270	410	570	750	940	1100	1300	1500	1800	2000	2100	2300
For each additional 10 feet beyond the 75 foot length in this table, add the following values														
	11	24	42	66	94	130	170	210	260	315	375	445	515	590

Table 2.4 Loose and Compacted Weight of Various Materials

	Loose			Compacted		
Type of Material	Pounds per Cubic Foot	Pounds per Cubic Yard	Approximate Pound per Square Yard per 1 inch Depth	Pounds per Cubic Foot	Pounds per Cubic Yard	Approximate Pounds per Square Yard per 1 inch Depth
	96	2590	72	122	3300	92
Trap Rock	100	2690	75	127	3420	95
	103	2780	77	131	3540	98
Granite/	90	2410	67	113	3060	85
Limestone	93	2500	69	118	3180	88
	96	2590	72	122	3300	92
	82	2220	62	105	2830	79
Sandstone	86	2320	64	109	2950	82
	90	2410	66	113	3060	85
	93	2500	70	118	3180	88
	97	2630	73	105	2830	79
Sand	101	2740	76	109	2950	82
	106	2850	79	113	3060	85
	110	2960	82	118	3180	88
	55	1480	41	70	1890	53
Slag	65	1760	49	83	2240	62
	76	2040	57	96	2590	72
	86	2320	64	109	2950	82
	91	2480	69	115	3100	86
Asphalt	100	2700	75	130	3510	97
Concrete	116	3130	87	145	3910	109
	128	3460	96	160	4320	120

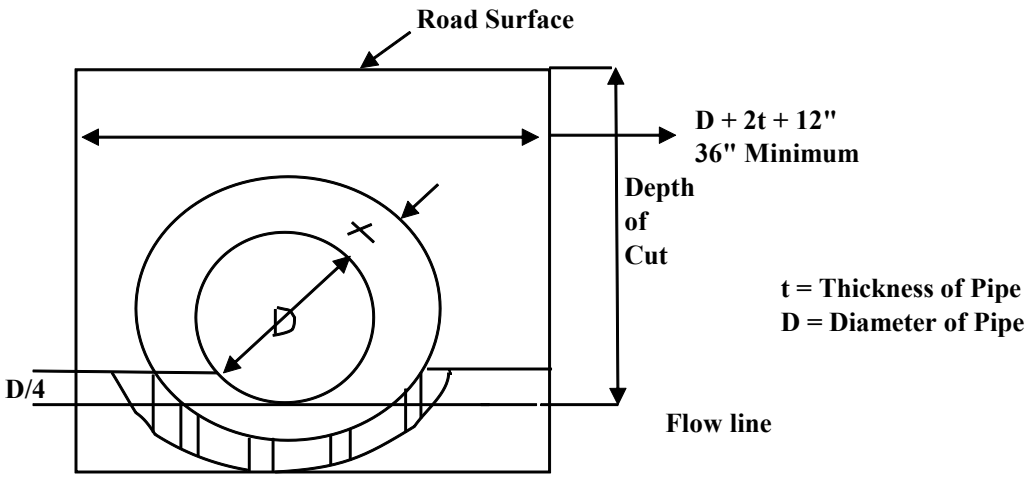
Table 2.5 Pounds of Compacted Aggregate Required Per Square Yard for Various Cubic Yard Weights

Pounds of Aggregate per Cubic Yard (Compacted wt.)	Pounds of Compacted Aggregate Per Square Yard for Various Depths in Inches											
	1	2	3	4	5	6	7	8	9	10	11	12
1800	50	100	150	200	250	300	350	400	450	500	550	600
1900	53	106	158	211	264	317	369	422	475	528	581	633
2000	56	111	167	222	278	333	389	444	500	556	611	667
2100	58	117	175	233	292	350	408	467	525	583	642	700
2200	61	122	183	244	306	367	428	489	550	611	672	733
2300	64	128	192	256	319	383	447	511	575	639	703	767
2400	67	133	200	267	333	400	467	533	600	667	733	800
2500	69	139	208	278	347	417	486	556	625	694	764	833
2600	72	144	217	289	361	433	506	578	650	722	794	867
2700	75	150	225	300	375	450	525	600	675	750	825	900
2800	78	156	233	311	389	467	544	622	700	778	856	933
2900	81	161	242	322	403	483	564	644	725	806	886	967
3000	83	167	250	333	417	500	583	667	750	833	917	1000
3100	86	172	258	344	431	517	603	689	775	861	947	1033
3200	89	178	167	356	444	533	622	711	800	889	978	1067
3300	92	183	275	367	458	550	644	733	825	917	1008	1100
3400	94	189	283	378	472	567	661	756	850	944	1039	1133
3500	97	194	292	389	486	583	681	778	875	972	1069	1167
3600	100	200	300	400	500	600	700	800	900	1000	1100	1200

Table 2.6 Cubic Yards of Material Required per 100 feet for various Loose Depths

Width of Area in Feet	Cubic Yards of Loose Aggregate Required for Various Depths in inches														
	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	3 1/2"	4"	4 1/2'	5"	6"	8"	10"	12"
8'	1.2	1.9	2.5	3.7	4.9	6.2	7.4	8.6	9.9	11.1	12.3	14.8	19.8	24.7	29.6
9'	1.4	2.1	2.8	4.2	5.6	6.9	8.3	9.7	11.1	12.5	13.9	16.7	22.2	27.8	33.3
10'	1.5	2.3	3.1	4.6	6.2	7.7	9.3	10.8	12.3	13.9	15.4	18.5	24.7	30.9	37.0
11'	1.7	2.5	3.4	5.1	6.8	8.5	10.2	11.9	13.6	15.3	17.0	20.4	27.2	34.0	40.7
12'	1.9	2.8	3.7	5.6	7.4	9.3	11.1	13.0	14.8	16.7	18.5	22.2	29.6	37.0	44.4
14'	2.2	3.2	4.3	6.5	8.6	10.8	13.0	15.1	17.3	19.4	21.6	25.9	34.6	43.2	51.9
15'	2.3	3.5	4.6	6.9	9.3	11.6	13.9	16.2	18.5	20.8	23.1	27.8	37.0	46.3	55.6
16'	2.5	3.7	4.9	7.4	9.9	12.3	14.8	17.3	19.8	22.2	24.7	29.7	39.5	49.4	59.3
18'	2.8	4.2	5.6	8.3	11.1	13.9	16.7	19.4	22.2	25.0	27.8	33.3	44.4	55.6	66.7
20'	3.1	4.6	6.2	9.3	12.3	15.4	18.5	21.6	24.7	27.8	30.9	37.0	49.4	61.7	74.1
22'	3.4	5.1	6.8	10.2	13.6	17.0	20.4	23.8	27.2	30.6	34.0	40.7	54.3	67.9	81.5
24'	3.7	5.6	7.4	11.1	14.8	18.5	22.2	25.9	29.6	33.3	37.0	44.4	59.3	74.1	88.9
25'	3.9	5.8	7.7	11.6	15.4	19.3	23.1	27.0	30.9	24.8	38.6	46.3	61.7	77.2	92.6
26'	4.0	6.0	8.0	12.0	16.0	20.1	24.1	28.1	21.1	36.1	40.1	48.1	64.2	80.2	96.3
28'	4.3	6.5	8.6	13.0	17.3	21.6	26.0	30.2	34.6	38.9	43.2	51.9	69.1	86.4	103.0
30'	4.6	6.9	9.3	13.9	18.6	23.1	27.8	32.4	37.0	41.7	46.3	55.6	74.1	92.6	111.0

Table 2.7 Cubic Yards of Material Required Per Foot for a Typical Culvert Installation



Depth of Cut to Flow Line in Ft.	D: / t:	12" / 2"	15" / 2 1/4"	18" / 2 1/2"	24" / 3"	30" / 3 1/2"	36" / 4"	42" / 4 1/2"	48" / 5'
2'		0.19	0.16	0.12					
3'		0.32	0.29	0.25	0.23	0.18			
4'		0.45	0.42	0.38	0.38	0.36	0.32	0.26	
5'		0.59	0.56	0.52	0.54	0.54	0.53	0.49	0.42
6'		0.62	0.69	0.65	0.69	0.72	0.74	0.73	0.68
7'		0.85	0.82	0.78	0.85	0.9	0.95	0.96	0.94
8'		0.99	0.96	0.92	1	1.09	1.16	1.19	1.2
9'		1.12	1.09	1.05	1.16	1.27	1.36	1.43	1.46
10'		1.25	1.22	1.18	1.31	1.45	1.57	1.66	1.72
11'		1.39	1.36	1.32	1.47	1.63	1.78	1.9	1.98
12'		1.52	1.49	1.45	1.62	1.81	1.98	2.13	2.24

Table 2.8 Number of Board Feet Per Lineal Foot for Various Sizes of Lumber

Width in Inches	Thickness in Inches									
	2	4	5	6	7	8	9	10	12	14
4	0.67	1.33	*	*	*	*	*	*	*	*
5	0.83	1.67	*	*	*	*	*	*	*	*
6	1	2	*	3	*	*	*	*	*	*
8	1.33	2.67	*	4	*	5.33	*	*	*	*
10	1.67	3.33	4.17	5	*	6.67	*	8.33	*	*
12	2	4	5	6	*	8	*	*	12	*
13	*	*	*	*	*	*	*	*	*	15.17
14	2.33	4.67	5.83	7	8.17	9.33	*	*	14	16.33
16	*	5.33	*	*	*	10.67	*	*	16	*
18	*	*	*	*	*	12	13.5	*	18	*
20	*	*	*	*	*	13.33	*	16.67	20	*
24	*	*	*	*	*	16	*	*	24	*

Table 3.1 Conversion Factors - Length Measurements

To Convert	To	Multiply By
Inches	Feet	0.08
Inches	Yards	0.03
Feet	Inches	12
Feet	Yards	0.33
Feet	Rods	0.06
Yards	Inches	36
Yards	Feet	3
Yards	Rods	0.18
Rods	Inches	198
Rods	Feet	16.5
Rods	Yards	5.5
Miles	Feet	5280
Miles	Yards	1760
Miles	Rods	320

Table 3.2 Conversion Factors - Area Measurements

To Convert	To	Multiply By
Square Inches	Square Feet	0.007
Square Feet	Square Inches	144
Square Feet	Square Yards	0.011
Square Yards	Square Inches	1296
Square Yards	Square Feet	9
Square Yards	Square Rods	0.03
Square Rods	Square Feet	272.25
Square Rods	Square Yards	30.25
Acres	Square Feet	43,560
Acres	Square Yards	4,840
Acres	Square Rods	160

Table 3.3 Conversion Factors - Volume Measurements

To Convert	To	Multiply By
Cubic Feet	Cubic Inches	1.728
Cubic feet	Cubic Yards	0.037
Cubic Feet	Gallons	7.48
Cubic Yards	Cubic Feet	27
Cubic Yards	Gallons	202
Quarts	Pints	2
Quarts	Gallons	0.25
Gallons	Pints	8
Gallons	Quarts	4
Gallons	Cubic Feet	0.13

Table 3.4 Conversion Factors - Weights and Other Measurements

To Convert	To	Multiply By
Ounces	Pounds	0.06
Pounds	Ounces	16
Tons(short)	Pounds	2,000
Tons(long)	Pounds	2,240
Miles/Hour	Feet/Minute	88
Miles/Hour	Feet/Second	1.47
Meters	Inches	39.37
Meters	Feet	3.28
Meters	Yards	1.09
Meters	Rods	0.2

TABLE 3.5 Conversion Factors - Common Fractions to Decimal Numbers

Fraction	Decimal Equivalent	Fraction	Decimal Equivalent	Fraction	Decimal Equivalent	Fraction	Decimal Equivalent
1/2	0.5	1/7	0.14	4/10	0.4	11/12	0.92
1/3	0.33	2/7	0.29	5/10	0.5	1/16	0.06
2/3	0.67	3/7	0.43	6/10	0.6	2/16	0.13
1/4	0.25	4/7	0.57	7/10	0.7	3/16	0.19
2/4	0.5	5/7	0.71	8/10	0.8	4/16	0.25
3/4	0.75	6/7	0.86	9/10	0.9	5/16	0.31
1/5	0.2	1/8	0.13	1/12	0.08	6/16	0.38
2/5	0.4	2/8	0.25	2/12	0.17	7/16	0.44
3/5	0.6	3/8	0.38	3/12	0.25	8/16	0.5
4/5	0.8	4/8	0.5	4/12	0.33	9/16	0.56
1/6	0.17	5/8	0.63	5/12	0.42	10/16	0.63
2/6	0.33	6/8	0.75	6/12	0.5	11/16	0.69
3/6	0.5	7/8	0.88	7/12	0.58	12/16	0.75
4/6	0.67	1/10	0.1	8/12	0.67	13/16	0.81
5/6	0.83	2/10	0.2	9/12	0.75	14/16	0.88
		3/10	0.3	10/12	0.83	15/16	0.94

Table 3.6 Conversion Table - Cubic Yards to Tons

Aggregate AASHTO Number	#'s per Cu. Ft.	1	2	3	4	5	6	7	8	9	10	YDS.
1	85	1.1	2.3	3.4	4.6	5.7	6.9	8.0	9.2	10.3	11.5	Tons
3	88	1.2	2.4	3.6	4.8	5.9	7.1	8.3	9.5	10.7	11.9	Tons
5	88	1.2	2.4	3.6	4.8	5.9	7.1	8.3	9.5	10.7	11.9	Tons
57	88	1.2	2.4	3.6	4.8	5.9	7.1	8.3	9.5	10.7	11.9	Tons
67	90	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.2	Tons
7	90	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.2	Tons
8	93	1.3	2.5	3.8	5.0	6.3	7.5	8.8	10.0	11.3	12.6	Tons
10	95	1.3	2.6	3.8	5.1	6.4	7.7	9.0	10.3	11.5	12.8	Tons
2A*	110	1.5	3.0	4.5	5.9	7.4	8.9	10.4	11.9	13.4	14.9	Tons
2RC*	110	1.5	3.0	4.5	5.9	7.4	8.9	10.4	11.9	13.4	14.9	Tons
Type A sand*	100	1.4	2.7	4.1	5.4	6.8	8.1	9.5	10.8	12.2	13.5	Tons
Pozzolan Base Course*	120	1.6	3.2	4.9	6.5	8.1	9.7	11.3	13.0	14.6	16.2	Tons
Bituminous Material												
ID2	72	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7	Tons
FJ1	85	1.1	2.3	3.4	4.6	5.7	6.9	8.0	9.2	10.3	11.5	Tons
484	70	0.9	1.9	2.8	3.8	4.7	5.7	6.6	7.6	8.5	9.5	Tons
485	70	0.9	1.9	2.8	3.8	4.7	5.7	6.6	7.6	8.5	9.5	Tons
Concrete Base (BCBC)	90	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.2	Tons
Anti Skid												
Type 1 and/or 1A	60	0.8	1.6	2.4	3.2	4.1	4.9	5.7	6.5	7.3	8.1	Tons
Type 2 and/or 2A	82	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.9	10.0	11.1	Tons
Type 3 and/or 3A	90	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.2	Tons
Type 4	90	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.2	Tons
Chemicals												
Calcium Chloride	55	0.7	1.5	2.2	3.0	3.7	4.5	5.2	5.9	6.7	7.4	Tons
Sodium Chloride	78	1.1	2.1	3.2	4.2	5.3	6.3	7.4	8.4	9.5	10.5	Tons
Premix Cal. & Sod.(1:5)	74	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	Tons

*** PennDOT Numbers**

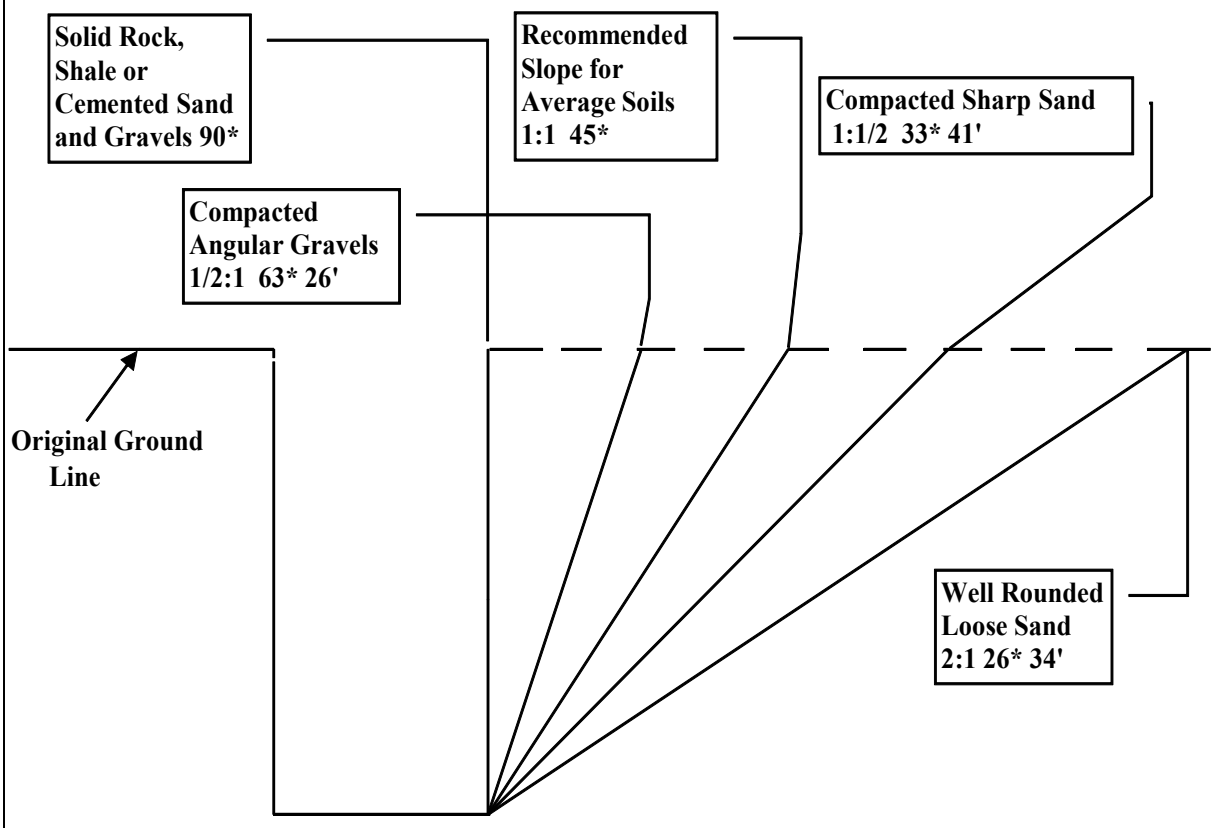
Table 3.7 Conversion Factors - Minutes to Tenths of an Hour

Minutes	Hours	Minutes	Hours
1	0.0	34	0.6
2	0.0	35	0.6
3	0.0	36	0.6
4	0.1	37	0.6
5	0.1	38	0.6
6	0.1	39	0.6
7	0.1	40	0.7
8	0.1	41	0.7
9	0.1	42	0.7
10	0.2	43	0.7
11	0.2	44	0.7
12	0.2	45	0.8
13	0.2	46	0.8
14	0.2	47	0.8
15	0.3	48	0.8
16	0.3	49	0.8
17	0.3	50	0.8
18	0.3	51	0.8
19	0.3	52	0.9
20	0.3	53	0.9
21	0.3	54	0.9
22	0.4	55	0.9
23	0.4	56	0.9
24	0.4	57	0.9
25	0.4	58	1.0
26	0.4	59	1.0
27	0.4	60	1.0
28	0.5		
29	0.5		
30	0.5		
31	0.5		
32	0.5		
33	0.5		

Table 3.8 - Conversion Chart - 50 lbs. Cans to gallons of Paraplastic Joint Sealing Co

No. of Cans	Gallons	No. of Cans	Gallons
1	6	31	171
2	11	32	176
3	17	33	182
4	22	34	187
5	18	35	193
6	33	36	198
7	39	37	204
8	44	38	209
9	50	39	215
10	55	40	220
11	61	41	226
12	66	42	231
13	72	43	237
14	77	44	242
15	83	45	248
16	88	46	253
17	94	47	259
18	99	48	264
19	105	49	270
20	110	50	275
21	116	51	281
22	121	52	286
23	127	53	292
24	132	54	297
25	138	55	303
26	143	56	308
27	149	57	314
28	154	58	319
29	160	59	325
30	165	60	330

Table 4.1 Approximate Angles of Repose For Sloping of Sides of Excavation



Note: Clays, Silts, Loams or Non-Homogenous Soils Require Shoring and Bracing

Table 4.2 Trench Shoring-Minimum Requirements

Depth of trench	Kind of Condition of earth	Sizes and spacing of members										
		Uprights		Stringers		Cross braces (1)						
						Width of Trench					maximum spacing	
		Minimum dimension	Maximum spacing	Minimum dimension	Maximum spacing	Up to 3 feet	3 to 6 feet	6 to 9 feet	9 to 12 feet	12 to 15 feet	Vertical	Horizontal
Feet		Inches	Feet	Inches	Feet	Inches	Inches	Inches	Inches	Inches	Feet	Feet
5 to 10	hard, compact	3 x 4 or 2 x 6	6			2 x 6	4 x 4	4 x 6	6 x 6	6 x 8	4	6
	likely to crack	3 x 4 or 2 x 6	3	4 x 6	4	2 x 6	4 x 4	4 x 6	6 x 6	6 x 8	4	6
	soft, sand, or filled	3 x 4 or 2 x 6	close shooting	4 x 6	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
	hydrostatic pressure	3 x 4 or 2 x 6	close shooting	6 x 8	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
10 to 15	hard	3 x 4 or 2 x 6	4	4 x 6	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
	likely to crack	3 x 4 or 2 x 6	2	4 x 6	4	4 x 4	4 x 6	6 x 6	6 x 8	8 x 8	4	6
	soft, sandy, or filled	3 x 4 or 2 x 6	close shooting	4 x 6	4	4 x 6	6 x 6	6 x 8	8 x 8	8 x 10	4	6
	hydrostatic pressure	3 x 6	close shooting	8 x 10	4	4 x 6	6 x 6	6 x 8	8 x 8	8 x 10	4	6
15 to 20	all kinds or conditions	3 x 6	close shooting	4 x 12	4	4 x 12	6 x 8	8 x 8	8 x 10	10 x 10	4	6
over 20	all kinds or conditions	3 x 6	close shooting	6 x 8	4	4 x 12	8 x 8	8 x 10	10 x 10	10 x 12	4	6